APRIL, 1927

Electrical West

With which is consolidated the Journal of Electricity

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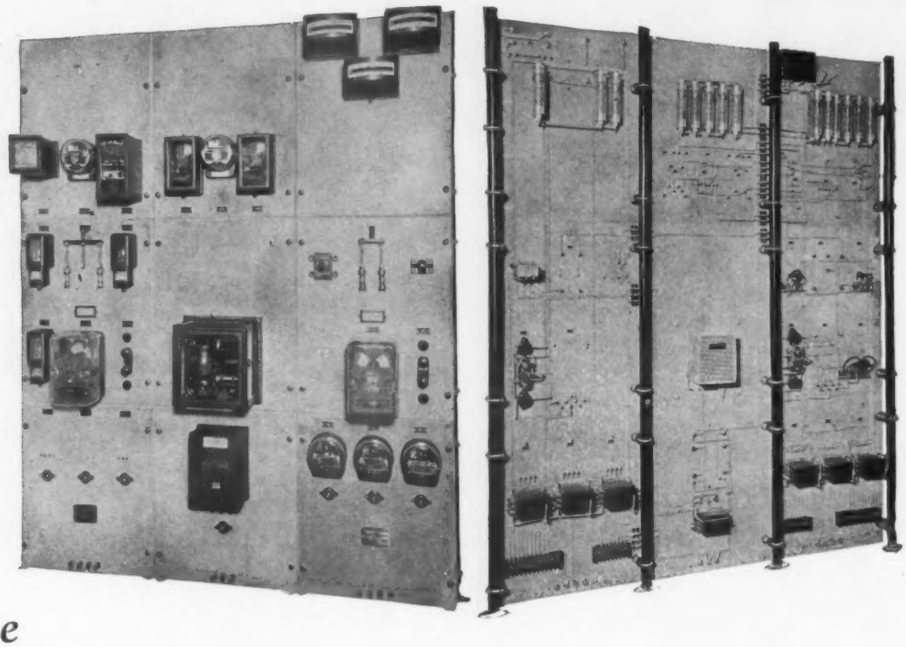

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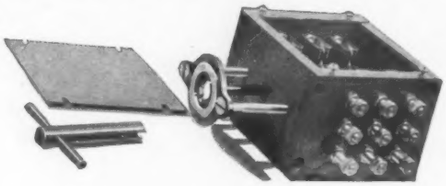

in testing relays and meters

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Anticipating California's Future Growth

TO meet the growth in California, the Southern California Edison Company added 429,000 horse power between 1921 and 1925. This increase is 114% compared with 54% for the whole country in the same five-year period.

The company's present capacity is 807,000 horse power and another five years' growth at this rate will see a demand of 920,000 horse power more.

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C. T. HUTCHINSON
Editorial Director

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G. C. TENNEY
Managing Editor

Volume 58 | San Francisco, April, 1927 | Number 4

Central-Station Responsibility for Efficient Lighting in the Home

ONE OF the principal features of the reports published each year by the lighting committee of the N.E.L.A. has been the statement of facts on lighting conditions in the home. Chief among these has been the recurring reference to many obsolete fixtures in the home and the relative inefficiency of the present lighting equipment. As each year passes this equipment is becoming more obsolete, yet little or no attention has been given to this subject despite the reports of the lighting committee. The interest created by the Home Lighting Contest has been allowed to lapse through a lack of active follow-up. Plans to capitalize the consumer interest developed at that time have not been pushed, with the result that home lighting has a relatively unimportant place in the central-station commercial program.

If the expressed desire to render efficient public service is to be more than a mere gesture with the power companies, then they are falling down in their obligation to their customers if they fail to direct attention to the inefficient and obsolete lighting fixtures that disfigure the majority of homes. If the responsibility for proper residential lighting belongs to the central station, then the responsibility of promoting and executing campaigns for refixturing the home is also theirs. Refixturing to give greater lighting efficiency requires the use of higher intensities with resulting increase in lighting revenue. Eighty-three per cent of the residential electrical dollar is for lighting; the power company has a service obligation in promoting better home-lighting standards.

Experience with the kitchen-lighting unit demonstrates what can be done when the problem of bettering lighting conditions in the home is attacked through a well planned program. The Pacific Gas and Electric Company has announced a home-lighting sales campaign for 1927 of which an efficient and attractive portable lamp with a capacity of 200 watts is an important part. Another is a porch light incorporating an illuminated house number. A recently developed dining and living-room fixture is a third item. The purpose of the campaign is twofold: to increase the lighting consumption and to give the customer better and more efficient lighting service.

The problem of improving lighting in the American home is one for the entire industry. The benefit to the fixture manufacturer is obvious—an increased market for his goods backed by the active co-operation of the central station. The contractor gains the revenue from hanging the new fixtures. The dealer profits by joining in any campaign the power company undertakes. The jobber gains from greater sales and at the same time acts as a co-ordinating agency between central station and contractor and dealer. But primarily the responsibility rests with the central stations for all other branches of the industry look to them for leadership.

Eight Months to Work for a New Colorado River Plan

A FILIBUSTER so pointed as to burst the Boulder Dam bubble blasted the hopes of Senator Johnson and Congressman Swing as the curtain was rung down on the Sixty-ninth Congress. If it did nothing else, the filibuster showed that the Boulder Canyon Dam Bill, in its present form, stands little chance of passing either the Senate or the House of Representatives. Having become inextricably mixed up in the politics of Arizona, Utah and Colorado, not even the efforts of some of the best "traders" in Congress could carve a right-of-way for the measure along with the McNary-Haugen Bill and the McFadden branch banking legislation.

Undoubtedly efforts will be made to frame some new policy with respect to the Colorado River during the months that intervene between now and the convening of the Seventieth Congress on the first Monday in December. Possibly an amicable settlement of the disagreements between the interests involved in the development of the river will be arrived at as the result of friendly deliberations. Certainly such a settlement is to be desired, for undoubtedly the public will not continue to brook the political fanfare and balderdash that characterized discussion of the Colorado River problem during the last Congress.

The possibilities of success of such deliberations would be enhanced considerably were certain fundamental facts borne in mind by the various parties to the controversy. It must be remembered, first, that flood control is a function of the federal government solely. Secondly, power development is amply protected and provided for by the terms of the Federal Power Act and can be hastened if the Federal Power Commission is given its right to exercise the authority provided it by law. Lastly, irrigation is a function of the Reclamation Bureau and can and will be taken care of by that agency.

It is to be hoped that the Coolidge administration will set forth a definite policy with respect to the Colorado River that embodies these points. With such a declaration of principles as a starting point it is conceivable that early development of the resources of the Colorado will become a fact. Without some such sound plan we cannot hope for more than a repetition of political acrobatics accompanied by plenty of red fire and smoke.

The Sub-Standard Appliance Evil

AN ITEM in this issue's news recounts the stopping of the sale of a 15-cent toaster in Portland. The inadequacy of this bit of tin and asbestos posing as an electrical appliance beggars description, as can well be imagined from its price, and though the incident in itself is not highly important, the significance contained in the story is of considerable interest since it illustrates admirably the sub-standard appliance evil. The story calls to mind the fact that lately more interest in this evil seems to have been displayed by legitimate manufacturers, central stations and municipal code administrators, and truly it is an evil on which there should be more coherent thought and concerted action within the electrical industry.

Before unqualifiedly condemning this toaster it would be fair to attempt to find a justification for its existence through balancing the possible benefits and detriments accruing to groups within and without the industry from its manufacture and sale. The first ones to receive a possible benefit from it are the manufacturer making it and the retail store selling it, both of whom make some profit. But if business is built upon good will and if good will depends in part on customer satisfaction with goods bought, then surely the benefits credited to these two will be short-lived and insubstantial. Next in line to receive benefit from the device would be the ultimate purchasers. Some of these possibly might figure that they received 15 cents worth of usefulness out of it, but no doubt many more received a shock or a burn or suffered some damage to a table or other piece of furniture if they did not actually start a fire. Third in line are the central stations which may sell a few kilowatt-hours through the device. But to him who would argue that this constituted a material benefit, let it be pointed out that one service call to replace a fuse blown by one of these devices would cost at least the revenue from a dozen of them operating ten hours each, and it is doubtful if there would be one good hour's service in any one of them before some kind of trouble developed.

If benefits are difficult to find, disadvantages come to mind easily. To those already mentioned we would add that accruing to the electrical industry generally when odium is cast on all electrical appliances due to the unsatisfactory operation of one appliance. Further, through unequal competition, there is a detriment to those manufacturers that make honest goods and to the retail stores that sell them—goods that have been built for durability and service, and, because of their practical and safe utility, do give the customer satisfaction. Another and less tangible detriment is that suffered by the general public, for if a fire is started the loss entailed goes far beyond the owner of the goods damaged to the community at large in the form of insurance rates and taxes for the maintenance of fire departments based partly on the prevalence and seriousness of fires in that community.

The debits appear to overbalance the credits in the case of the 15-cent toaster and others like it, and this raises the question as to how the evil of the sub-standard appliance can be abated.

Portland's way is effective as far as that locality is concerned. Portland's code contains the provision that non-approved appliances shall not be *sold*, and control is exercised through its dealer licensing provision. Other cities have attempted to accomplish the same purpose by legislating that such appliances shall not be *used*, thus entailing the demonstrably impossible act of condemning all such appliances after they have reached the ultimate user. Portland stops the inflow by plugging the hole, while other cities rely ineffectually on a process akin to bailing out the boat after the leak has allowed the water to enter. The present instance of a conviction and fine is evidence that Portland's law is enforced and that it is made effective by having teeth in it. The regrettable feature of the case is that the remaining stock of the condemned 15-cent toaster in Portland eventually will find its way into another market in which the retail agency has a store in its chain, into a community with less active watchdogs of the public interest or with no adequate machinery at its disposal for controling the situation. There the toasters will live out their brief trouble-making existence only to be followed by others of the same ilk.

We commend the Portland method to the consideration of those interested and repeat that the subject is one worthy of serious thought among all groups of the industry.

Refrigerator Trades Association May Aid Stabilization of Industry

STABILIZATION is essential for sound development of the electric refrigeration industry. Newer than radio and with a future of great possibilities, electric refrigeration development will require expert guidance if its progress is not to be retarded by the many difficulties that new enterprises ordinarily face. In achieving stabilization the industry cannot do better than adopt some of the practices that have been developed in other lines of business in which experience has been similar.

Comparison has been made frequently between the electric refrigerator industry and the automotive industry. It is conceivable that some of the trade practices developed by the latter can be applied successfully to the refrigerator industry sufficiently early in its development to prove of great good. One such practice has been the formation of local dealers' trade associations in every large city. The purpose of these associations has been to create and follow up a code of business ethics and trade practices, to prepare and circulate statistics on the progress of the industry, to combat unsound practices and legislation and to foster educational and co-operative movements.

Already the need for some such organization in the refrigerator business has been felt in many cities. The refrigeration survey conducted by the McGraw-Hill electrical papers last year revealed destructive and unethical trade practices in many localities. Local rulings inimical to greater refrigeration sales are becoming more frequent. Mention may be made of a requirement by the Board of Health in San Francisco calling for the installation of a sewer-connected drain to each electric refrigerator, and of a ruling by the electrical departments in several cities that each refrigerator must have a separate convenience outlet circuit. The possibilities of educational movements, such as the automobile shows conducted annually in the larger cities or co-operative advertising campaigns, if applied to the electric refrigeration business, are too obvious to require comment. All of these problems lend themselves to solution through co-operative study by an organization composed of refrigerator dealers, distributors and manufacturers' representatives in the various cities.

Such an organization has been formed in Portland,

Ore., under the name of the Refrigerator Trades Association. Its purpose as set forth in its by-laws is to "build up and stabilize mechanical refrigeration and promote harmony among the dealers and salesmen or representatives of members." Dues are nominal and the form of organization simple. Already several problems have been attacked with success, and plans are being perfected for a co-operative educational advertising campaign.

The same plan can be followed out in any locality. Perhaps because the central station is one of those primarily interested in the development of the refrigerator load and because the industry generally looks to the central station for leadership it should be the one to suggest such a procedure. At any rate if such organizations were formed, there would be no lack of problems to be studied or work to be undertaken.

The Commercial Man Takes a Hand in Rate-Making

IN ESTABLISHING a new optional combination domestic rate (ELECTRICAL WEST, March, 1927, p. 174) the Utah Power & Light Company has departed materially from conventional rate forms for domestic service that include the use of such devices as the electric range, water heater and refrigerator. The new schedules are in line with the plea of the commercial department to provide a series of charges for domestic service that will encourage the use of heavy-duty household equipment without some of the objectionable factors that heretofore have featured such rates.

The lighting and cooking rate carries a flat charge for a house of four rooms or less of $2 per month, including 34 kw-hr., 35 cents per additional room, including 6 kw-hr. per room, and 2¾ cents per kw-hr. for all excess energy used. For lighting and refrigeration the initial charge is $3, including 51 kw-hr., the charge per additional room is the same as above and the consumer pays 4.5 cents per kw-hr. for all energy in excess. Lighting, cooking and water-heater heating carry an initial charge of $3.50 per month, including 60 kw-hr., with a 2¾-cent charge for the first 150 kw-hr. in excess and 2¼ cents for all additional energy used. The addition of a refrigerator merely increases the initial charge in the above schedule to $4 per month for 68 kw-hr. These rates apply in Salt Lake City and Ogden, the schedules in other districts carrying the same initial charges for slightly less energy in the first block.

A study of the rates indicates that the minimum per kilowatt of connected load has been eliminated. Also the rate earned by a refrigerator is in keeping with the value of this service to the consumer and at the same time will enable the refrigerator to be sold to a lighting consumer at a charge lower than straight lighting rates. The schedules, too, are exceedingly simple to understand.

With general recognition of the importance of domestic load-building has come the realization that the man who sells the appliances should be admitted to the rate-making councils. The commercial manager, through his knowledge of the sales resistances that impede greater progress in load-building, is best qualified to state what a customer is willing to pay for any particular service that electricity will provide in the home. The new schedules filed by the Utah Power & Light Company show that the commercial man has been given such recognition. He has been provided with a domestic rate that should greatly facilitate his selling efforts. The industry will watch with interest the progress made with this rate in the territory of the Utah company.

What Is Washed Must Be Wet

UNDER the provocative title, "Do Firefly Winks Sell Much Electricity?" the February number of the *Pacific Laundry Journal* manages to work itself into a considerable lather over central-station merchandising of electrical washing machines for the home, thereby opening up an old wound and rubbing soap into it, as it were. As in any controversy over the relative merits of many small electrified home units as against a few large commercial units, there is some merit in what it says. However, there can be no doubt as to a large percentage of bubbles being stirred up in the process.

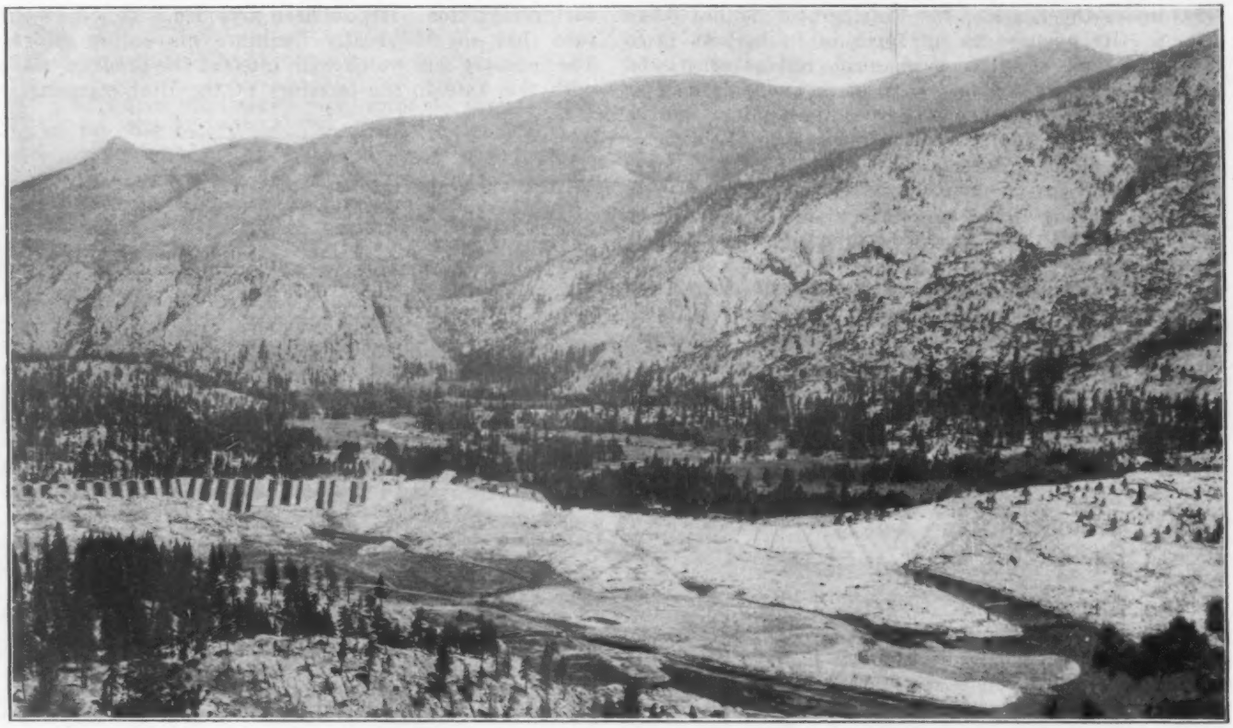
Rightly enough, the laundry magazine calls attention to the low per-unit power consumption of the domestic washer and wonders if it is not more to the advantage of the central station to safeguard the load furnished by the large single laundry. A large and impressive array of figures is marshaled to demonstrate the case.

It is admitted that the central station should evaluate properly its laundry customer even as it should its refrigeration plant customer, safeguarding the interests of both to the full extent consistent with the logical field of each. And yet in the larger sense, it is true also that the rights and privileges of a larger group, the ordinary customers, must be maintained as well.

There is one human fundamental that the *Laundry Journal* in its analysis has seemed to overlook completely. It has not visualized the washing machine in the place which experience shows it to occupy. In a great majority of cases the washing machine is sold in the home in which the laundry work is done by hand—not sent to the laundry. If it goes into the home which previously has sent laundry out it goes there to do the laundrying only of such articles as the housewife formerly had done by hand.

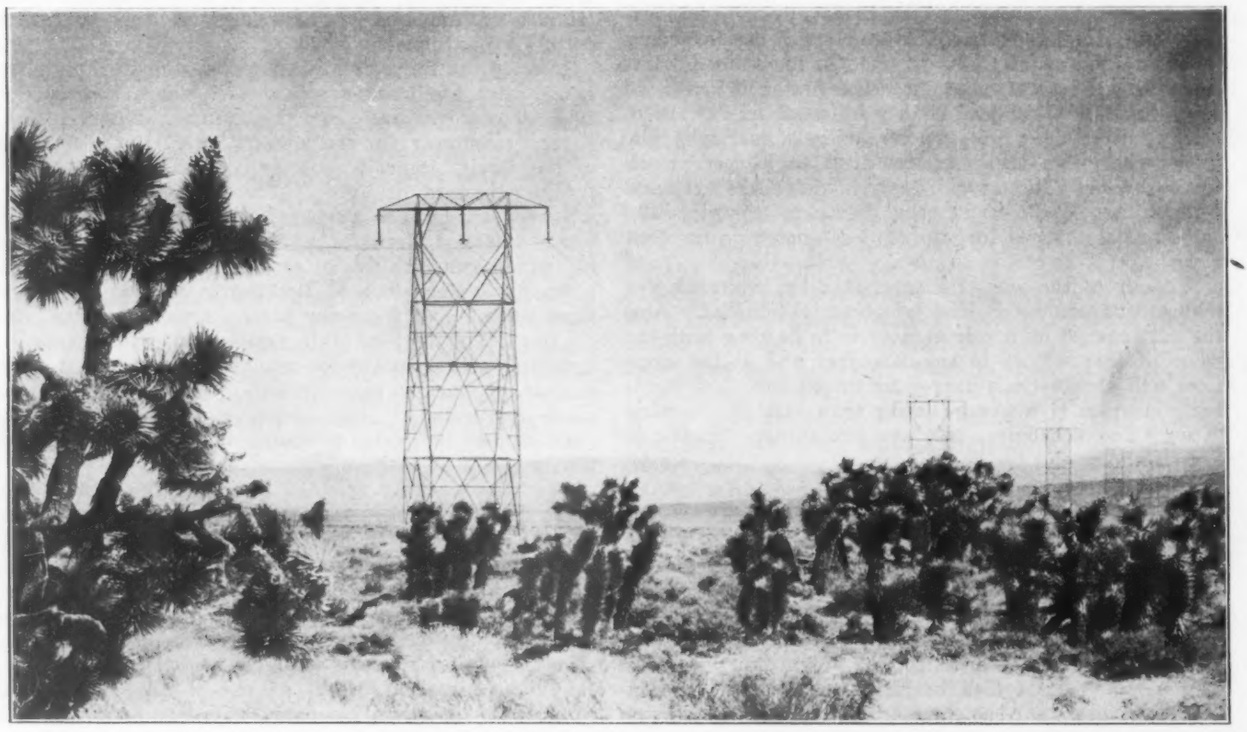
It is to the large family, however, the working-class home, that the washer sells best. There it does not take a customer away from the laundry. It merely prepares a customer for the laundry later, if the finances of the family improve sufficiently to allow an advance in the standard of living. The bridge-playing housewife seldom buys a washer. It is the mother of six whose husband works in a factory and whose laundry bill would run into five or six dollars a week who gets a washer. Her stock of clothing is not large enough to permit of even three-day service from a laundry, and the wear and tear on this small stock of clothing in laundry washing means too much to be overlooked. The mother of one or more infants, who has to wash a whole wardrobe of baby clothes each day, 365 days a year, cannot be denied a washer out of any consideration for size of load or class of customer.

That the washing machine is one of the first of the three staple appliances to enter the home is also a factor not reckoned with by the laundry magazine. Neither the washer nor the vacuum cleaner is much of a load-builder in itself, but both of these educate the housewife to electrical convenience and desirability. Then as family finances improve there come the other appliances—and the week's wash goes to the laundry. Certainly the situation is not so bad as the laundryman would have the power company believe.



Important Elements in Southern California's Power Supply

ACTIVITY on the Big Creek project of the Southern California Edison Company continues apace. Above is a view of the new Florence Lake reservoir and dam on the South Fork of the San Joaquin River. Here is storage capacity for 65,000 acre-ft. of water that ultimately passes through the Florence Lake tunnel into Huntington Lake and thence through the Big Creek power house. Below is a view of the new 220-kv. Vincent line between Big Creek and Los Angeles. At this point the line crosses a desert stretch of Antelope Valley.

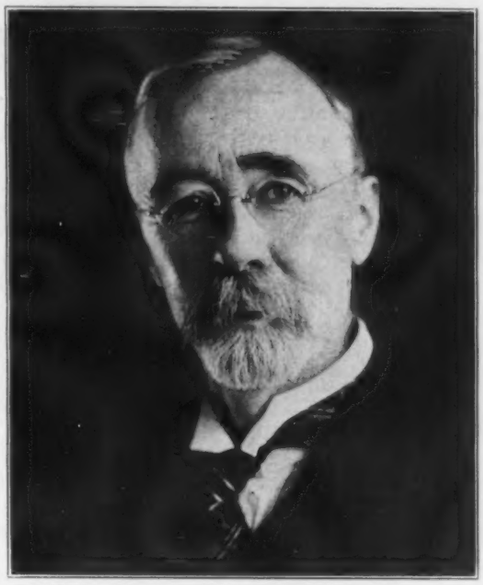


Building and Maintaining an Efficient and Harmonious Organization

By Major Cooper Anderson

General Superintendent of Production and Transmission, Utah Power & Light Company, Salt Lake City

I AM writing this on Christmas morning—a fitting time to send out a message of good will, kindness and helpfulness. The question has been asked: "What is the most important problem in the operation and maintenance of a large interconnected hydroelectric and steam-electric generating and high-voltage transmission system?" Experience gained from the consolidation, operation and maintenance of an interconnected system of some 40 generating plants having a total installed capacity of 250,000 kw. and 2,000 miles of high-voltage transmission circuits controlled by about 1,200 miles of private telephone and telegraph circuits, indicates that the answer to the above question can be expressed in one word—loyalty.



MAJOR COOPER ANDERSON

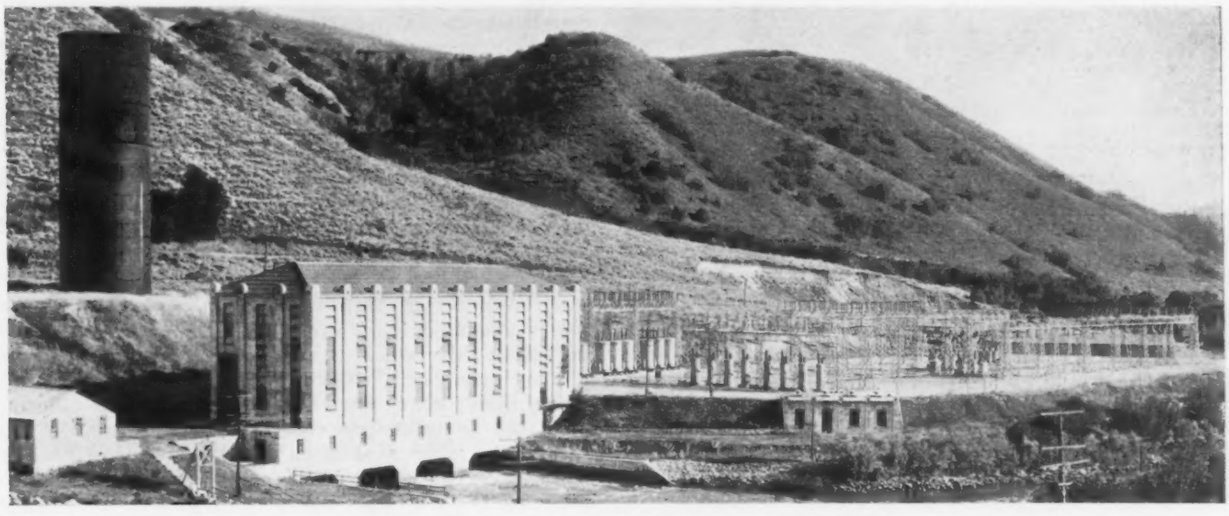
says, "The basis upon which the successful operation of the department of production and transmission is built is that of a mutual loyalty, based on confidence, helpfulness and respect, along with a full knowledge and understanding on the part of each individual of the entire workings of the department so far as it is possible."

Loyalty is the very cornerstone and foundation of every successful organization. Without it unlimited capital supported by the best technical and executive ability would not suffice to obtain the high results demanded where "efficient public service" is an actuality and not a catch phrase.

Loyalty cannot be one-sided. Loyalty is mutual if it is anything at all. The requirement is as great for the employer's loyalty to the interests of the employee as for the employee's loyalty to the interests of the employer. This mutuality of interests cannot be stressed too strongly. "With what measure ye mete, with that shall it be measured you again." Sentiment or attitude toward another usually is returned in kind.

B. C. Forbes, one of the outstanding writers on business, recently has stated that if he were asked to name the most significant development of 1926 in the realm of business he would reply, "The realization by our more enlightened corporations that the greatest loss of all is that due to hostile or only lukewarm working forces; and that there is infinitely more room for increasing profits by the development of intense loyalty than in any other direction, not excluding invention and installation of more labor-saving machinery. What is needed to foster a spirit of co-operation and team work is kindness, tolerance, unfailing friendliness and helpfulness.

A power company is engaged primarily in rendering "efficient public service." All divisions of the company's activities must be designed and must function with this one common aim in view. Of course, this applies with equal aptitude to every

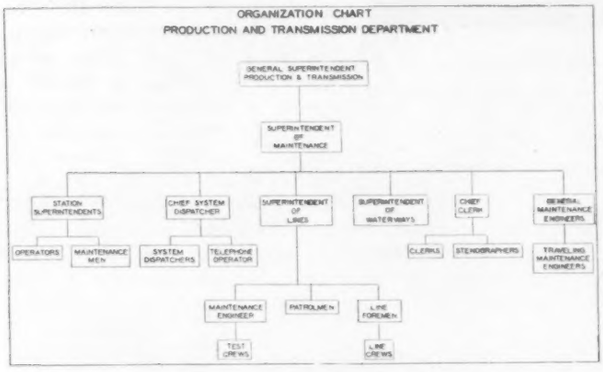


Oneida hydro plant of the Utah Power & Light Company

department, but this discussion will be limited to a consideration of the department of production and transmission, its organization, responsibilities, personnel and activities.

Specifically the department of production and transmission is engaged in the generation and transmission of electrical energy in quantity and quality such that "efficient public service" may result. In order that the best results may be obtained there are certain essentials that every employee must know and appreciate. One of the most important of these essentials is the interest of each employee in the success of the organization. Each man must realize that the success of the organization and his own success are mutually dependent, each upon the other.

There are many opportunities to become thoroughly familiar with a station and its methods of operation and maintenance that are offered an employee while working in and about that station. Such intimate knowledge not only is necessary to the proper conduct of the station, but is essential to the promotion of the individual. It is expected that employees will look for and find these opportunities regardless of their regular hours of work. There are available at each station, and elsewhere, various blueprints of station wiring, piping, machine details, etc., as well as instruction books written by manufacturers and others explaining the various equipment. Each operator finds it to his advantage to become familiar with these because he is expected to understand the construction and operation of all apparatus. His rate of advancement depends upon his knowledge of the apparatus in the station. Such study and effort on the part of the employee well may be encouraged actively and even required by an operating company.



Organization chart of the department of transmission and production.

It is an axiom in all industries that the trained man is the one who succeeds; that he is the last one to be laid off in times of tress and the first to be considered when promotions are possible.

Every man must live with the man he makes of himself; and the better job he does in molding his character, the better company he will have. Doubtless there are times when a man is discouraged because of a seeming lack of interest in his personal progress. It is particularly important that the individual guard against these times and impressions of this nature by keeping on with his study and application. Permanent success is a gradual process, so gradual that those who achieve it are more concerned with the task at hand than with the ultimate goal for which they strive. Success and happiness are bound to come to the man who takes a proper pride and pleasure in his work.

Another very important essential in rendering "efficient public service" is the realization that interruptions to customers' service must be reduced to the absolute minimum. This result can be obtained only by each man on the job constantly giving the closest scrutiny to all apparatus, lines and equipment and by having all tools and repair material in good condition and in proper places. In case of an interruption to a customer caused by failure of a line or a piece of apparatus it is most important that the best possible judgment or effort be used to restore normal service in the least possible time. This calls for high speed in work and particularly strong effort regardless of the time of day or night or of weather conditions. Merely because the interruption may occur at night or during inclement weather it is not to be supposed that the restoration of normal service should be delayed by handling the matter in a routine way. Normal service must be restored in all cases at the first possible moment and extraordinary effort should be made to accomplish this result. This is one of the cases wherein a personnel with a high morale and high regard for its department efficiency demonstrates the justification of the efforts put forth in its training, development and upbuilding.

Further, it should be apparent that individual efficiency must be secured in every way possible. There are many small operations and every-day occurrences in which it is possible to improve upon the particular method in vogue or the practice used, such improvements resulting in greater individual and plant efficiency. In an efficient operating organization every individual is watching alertly for these opportunities. The company asks that in the spending of company money, in the use of materials, and in the spending of the time for which each man is paid by the company, the same economy should be practiced as if the expense were to be borne by the individual personally. To avoid waste is to promote efficiency.

System Operation

That part of the company's property coming under the jurisdiction of the department of production and transmission consists of a large number of reservoirs, waterways, storage-water control stations, generating stations, substations, transmission lines of various voltages and telephone lines, all interlinked in one network or system to serve all the principal towns and industries in Utah and southern Idaho. Routine operation of these various parts as a whole is accomplished through the system dispatchers. Obviously the best and most efficient co-operation possible should be extended to the dispatching organization in the execution of orders and in making reports in order that the system as a whole may be operated most efficiently.

The best barometer of a company's efficiency is the ability of its employees to co-operate. "One of the finest things in life is co-operation. Its builds power, peace and prosperity." So states Edwin S. Webster recently in *Forbes*. Coming from one of the most distinguished and successful men in the power industry this statement is worthy of the best possible consideration.

All routine switching affecting the operation of the system is done only on orders from the dispatcher. Exception to this rule is permitted only in conditions of extreme emergency. Certain of the more important system disturbances have been analyzed and specific instructions or "standing orders" issued to certain key stations covering a skeleton of the operating routine required for the re-establishment of service under certain conditions. These instructions provide a working

basis for the stations most vitally affected and provide for quicker restoration of service—particularly in the event of a contemporary failure in the communication system isolating the dispatcher. Speed in service restoration is the object; the proper interpretation of conditions is up to the operator. Even in emergencies, however, speed must be secondary to good judgment and safety.

Reasonable salary rates are established which permit

Lifton pumping station which pumps the waters of Bear Lake into Bear River to serve a string of hydro plants.

periodical increases according to length of satisfactory service in the same position, with opportunities for promotion for those showing increased ability, initiative and capacity. The men at the generating stations, remote from towns or cities, are provided with comfortable modern homes in pleasant surroundings. A point is made to have the station and residence grounds attractive with lawns, trees and flowers.

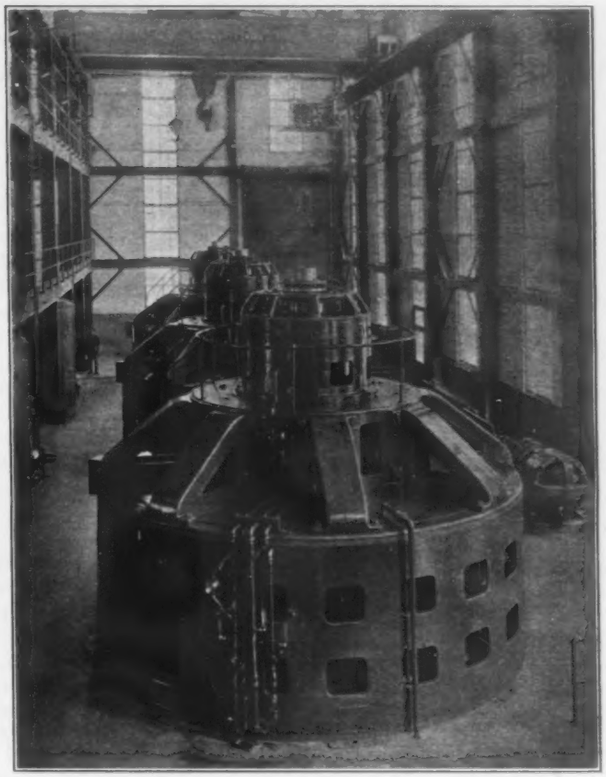
Station Organization and Operation

The number of men regularly employed at any station or substation depends upon its relative size and importance and upon the conditions under which that particular station is operating. Each station organization and each individual within that organization bears a certain definite relation to the department of production and transmission as a whole and it is essential that the responsibilities incumbent upon the individual through this system be thoroughly understood by the employee concerned. The general duties of the superintendents, operators and other employees are definitely outlined and should be thoroughly understood by all persons in interest.

The superintendent of each generating station is responsible for the results obtained at his particular station. This is a broad responsibility and leaves the way entirely open for much constructive work on the part of the superintendent. To get results he must have his men properly trained. Toward this end he should encourage each individual under his direction to put forth his best effort on the job and to put forth consistent study of the operating requirements of his own station as well as of the system in its entirety.

A station superintendent must realize that he is in charge of the company's property and that he has the entire responsibility for its operation and maintenance. He is responsible for the proper performance of duty by all employees under his direction and should make daily inspections to see that nothing is neglected. Also, he is responsible for the maintenance of the morale of all employees under his direction and must exert himself to build this to the highest possible point. The occasional inspections and repairs made by traveling maintenance engineers of the production and transmission department are considered only as an assistance to the station superintendent in maintaining his apparatus in the best possible operating condition and in no way relieves the station superintendent from direct responsibility.

The station operator is responsible to the chief operator, assistant superintendent or station superintendent, as the case may be, for the condition of the station during the hours of his shift. He is expected at all times to know the condition of all of the apparatus within his keeping. He should know the amount of load on all generators and transformers; the general condition of switches, governors and other equipment; he should know the important relay settings; the operating temperatures of various pieces of equipment and the exact electrical circuit connections, the location of valves and oil and water pipe lines and other items of similar importance. He is responsible for the proper



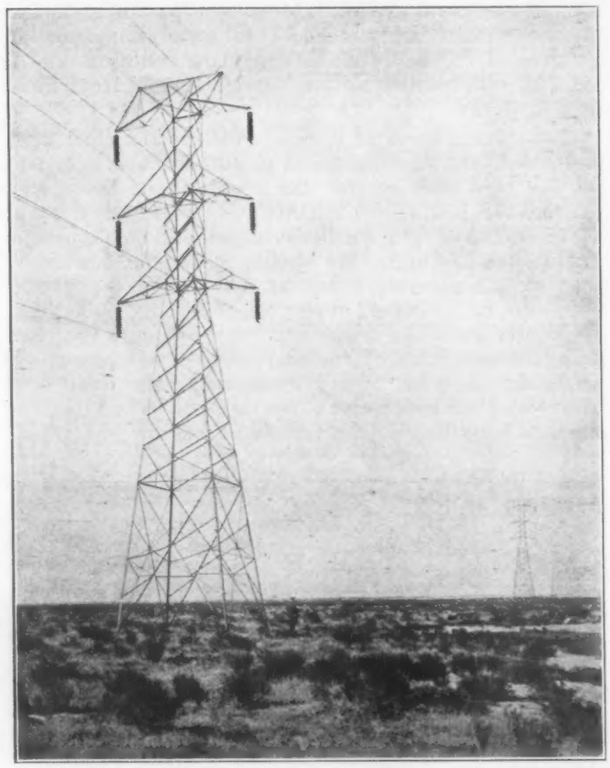
Interior of the Oneida plant.

performance of all duties arising during the hours of his shift. He is supposedly competent to take any steps necessary to relieve an immediately dangerous condition and should do so at once, notifying the station superintendent at the earliest possible moment of the condition existing.

Where there is more than one operator on shift the first operator is to direct the other operators on duty during his shift in the performance of their duties. He should make at least one complete personal inspection of the station each shift unless the second operator is

inexperienced or not competent to be left at the switchboard for a few minutes. The first operator never should leave the station unless relieved by another first operator.

In short, the basis upon which the successful operation of the department of production and transmission



Bear River 130-kv. transmission line.

is built is that of a mutual loyalty based on confidence, helpfulness and respect, along with a full knowledge and understanding on the part of each individual of the entire workings of the department so far as is possible. The authority and responsibilities of each individual and each class of individuals is outlined in detail to avoid all chance of misunderstanding and to give some definite idea of the possible advancement opportunities.

Each individual employee is made to feel that he is an integral and important part of the department. This is accomplished in part by offering him the opportunity to acquaint himself fully, through the instruction book, with the outstanding features of the entire department, partly due to other educational efforts, and partly due to the assignment of a definite responsibility and the encouragement of the individual to use his own head and to think in terms larger than those of his immediate job. Suggestions and criticisms pertaining to possible betterment in system operation and maintenance or in station operation and maintenance not only are accepted, but are expected.

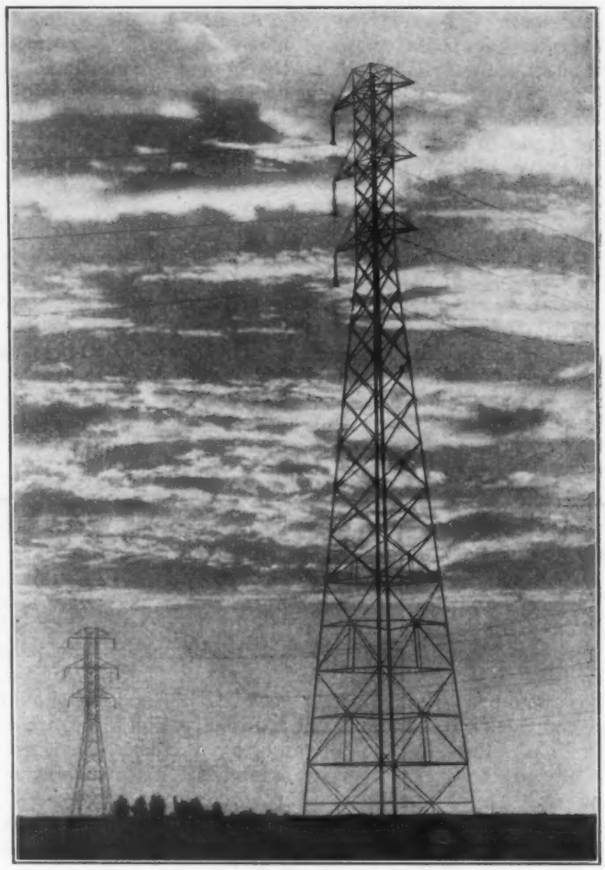
As in any successful enterprise, it usually will be found that one of the most important reasons for such success is the vigorous attention to and pushing to completion of, innumerable details. This requires not only more than ordinary effort on the part of the operating executive, but encouragement—both moral and financial—from the general executives of the concern. It is felt that one of the good reasons for the successful operation of the system described has been in the attitude and ability of each man in the organization to look beyond his prescribed duties and to "see" troubles and disaster before they happen and in the effort of everyone concerned in vigorously adopting all means necessary to prevent such occurrences. Also in the ability of the men to produce ideas pointing toward improved methods and progress in the art of production and transmission and again in the effort of the executive in seeing that such ideas and plans are pushed to successful completion and put into practice.

Lack of understanding on the part of the general executives of the problems encountered and the work accomplished by the operating organization too often is the cause of the operating executive's becoming discouraged and the cause of his accepting this condition as such and merely doing his best under the circumstances. As a contrast to the above, the operating executive should accept conditions as he finds them, of course, but also should realize that one of the important parts of his job is to carry on whatever amount of effort in "selling" is necessary to insure that the operating problems *are* understood by the general executives and to insure that he *will* secure the proper encouragement—moral and financial—for all sound operating policies advanced by him.

Small things count. To multiply an infinitesimal unit of profit by an enormous co-efficient of production results in a dividend-yielding income.

Loyalty, efficiency and cheerfulness is our guiding motto that has resulted in one of the most harmonious and efficient operating organizations in existence.

California Transmission Construction



High tower on the Brighton-Wilson 220-kv. line of the Great Western Power Company at point of crossing over Hetch-Hetchy line.

Radio Interference Experiences

A Discussion of Denver's Radio Troubles and Their Solution

By Oliver P. Reed

Distribution Engineer, Public Service Company of Colorado, Denver

ALL ELECTRIC circuits possess self inductance of the wire, electrostatic capacity between wires and a supply of electric energy. It follows that wherever a spark occurs interference will be produced. Conversely, the major portion of radio interference is produced by electric sparks which excite the supply circuit causing radio-frequency currents to flow along and between the wires.

Electrostatic capacity between the wires of the lighting mains is one of the factors contributing to the occurence of interference. Therefore the electrostatic capacity between the lighting mains and any other adjacent wires, including wire fences and clothes lines, will permit transference of radio-frequency currents to other conductors. These in turn carry the disturbance along their paths to a greater or lesser degree depending upon the service taps or other means of energy dissipation. Directional indications as given by a loop aerial are of no practical value in the tracing of faults due to the multiplicity of power, telephone and signal circuit networks which spread the disturbing oscillations.

2.3 Kv. Lines

The foregoing demonstrates the characteristics of interference troubles on constant-potential circuits. The chief things that occur on 2.3-4-kv. Y systems with neutrals solidly grounded at the station are: lightning arresters discharging, bad contacts in primary fuses, poor joints and other poor contacts due to poor soldering. These disturbances are heard largely along the route of the primary circuit between the power house or substation and the fault, decreasing in intensity in a greater degree beyond the fault than between the fault and the source of power.

On occasions of this kind the author has gone to the main feed of a given circuit, where the first branch line taps on, and has followed the noise along the main feed to the branch on which the fault is located and along that branch directly to the fault. In following the main lead it will be found that the noise decreases sharply within 100 or 200 ft. after passing the branch on which the trouble is located. This also is true in passing the fault proper; when a point is reached beyond which the noise decreases rapidly thorough inspection usually reveals the trouble. It is preferable to have the tracing set available when the inspection is made in order that the inspector may be certain when he has corrected the cause. In locating noises of this nature it often is of material help to plot on a map the complaints received. This usually checks out with the route of the current flowing to the fault and gives forehand knowledge of the location of the noise. The tone will be the frequency of the a.c. system and is a peculiar ear-piercing, ragged buzz sounding something like pouring shot on a kettle drum.

On systems which operate with solidly grounded neutrals very little trouble should be experienced from tree grounds since these probably burn off shortly after occuring. Further, on distribution systems where series street-lighting circuits usually are carried on the outside pins of a 4-pin arm with the primary on the pole pins the primary lines are protected in a large measure. There has been much trouble experienced from tree grounds on series circuits that will be discussed later. It is the opinion of the author that, in the case of a 2.3-kv. delta system, tree ground troubles would be experienced similar to those which have been found on series circuits, due to the fact that the ground potential is not definitely determined and tree grounds which occur will burn without sufficient power behind them to burn them off or to burn down the circuit. The cases of lightning arrester leakage which have been found in Denver to date are less than one per cent of the total number installed.

13-Kv. Lines

On 13-kv. systems the problem is much more difficult due to several contributing factors:

(a) The liability of arcing is much greater in view of the fact that much greater care must be used in installation to insure against arcing from line wires to various metal parts which serve to hold the line wires in place, but do not normally carry current. This is true since atmospheric and other leakages together with capacity effects produce a continual charging of the metal parts involved. One striking case of this occurs with the use of weatherproof wire on pin-type bus supports, the insulators having a metal cap and clamp for holding the conductor in place. A steady stream of sparks will pass from the conductor through the insulation to the metal cap.

(b) Several times the amount of power is involved where faults occur on 13-kv. lines. The intensity of the disturbance is in proportion to the amount of power involved.

(c) Insulator failures are more frequent due to line phenomena. Complete destruction of the insulators involved does not always occur, but they frequently are punctured and weakened so that continual arcing ensues.

(d) The area covered normally is many times greater and thus there is much more territory affected by any one disturbance.

Tracing these noises is an operation similar to that to be used on any constant potential system. However, it will be found that a buzz on this service does not show the marked decrease when passing beyond the fault as is characteristic of trouble on the 2.3-4-kv. system. This condition probably obtains in view of the relatively fewer connections to 13-kv. systems than to 2.3-4-kv. circuits, while on lighting secondaries the service taps give many paths for the dissipation of the radio-frequency energy resulting in a sharp demarcation of the limits of the oscillating circuit. The operator must depend upon his ability to trace the noise to the loudest point in this case. It will be found that the noise will be equally loud over a length of line of probably one-quarter mile or more. However, arcing

on 13 kv. usually is heard easily from the ground by ear, and inspection of that section of the line probably will reveal the trouble.

Loose contacts on transformer and line fuses are a frequent source of trouble and it has been found that a piece of iron wire resting on the line and on the cross arm produced a loud disturbance. Frequent trouble has been traced to broken insulators, both dead-end and pin type, particularly in cases where metal pins are used and where the failure usually is from wire groove to pin top through the body of the insulators.

Series Circuits

The series circuits present a problem of an entirely different nature. Tree grounds cause much trouble and much may be gained by consistent trimming of all branches in contact with the series wire. The characteristics of this class of service are a long loop circuit with large distributed inductance and capacitance and giving rise to resonance which makes the location of noises very difficult. Further, small loops may occur within the circuit due to the physical routing of the series wire which give rise to a condition of local resonance within the loop. It has been found that noises originating in that quarter of the circuit nearest to the positive feed have been heard distinctly near the negative end of the circuit when small loops occur. Noise also is loud where the feed wires separate after leaving the station, regardless of where the trouble may be located.

Noises originating within the circuit seldom are transferred to other series circuits in any marked degree except those within the area enclosed by the circuit. Noises originating on the circuit feed wires or within the station equipment are transferred to adjacent circuits wherever a large number of series circuits leave the station along the same pole line.

One of the main leads in Denver traverses a residential portion of the city located on the south side of, and adjacent to, the business district. This lead carries several classes of service including several series street-lighting circuits which originate at one of the stations and serve the districts adjacent to the lead for a mile or more on either side, except for a few circuit areas that are served by pole-type constant-current regulators. A complaint was received from a resident of the street which this lead traverses whose home was located about midway between the substation and the end of the line. Investigation proved a weak buzz to be present that could be heard on the complainant's set with an intensity about equal to that of out-of-town broadcasting stations, and which came on with the street lights and disappeared as they were turned off. A thorough check was made of the street-lighting circuits in the neighborhood, revealing the presence of resonance in all loops adjacent to the main lead.

While this inspection was in progress a large volume of complaints was received from the district located at the end of this same lead, the major portion of the complaints originating within the area of a certain 4-amp. rectified circuit. This circuit was checked foot-by-foot from the positive to the negative end revealing the loudest points to be within the area covered by the first three loops adjacent to the negative end of the circuit. Each of these loops was small containing only two lamps each. All three were shorted out and physically disconnected from the circuit leaving the six lamps out of service, but the noise remained unchanged in the remainder of the circuit. The next step was to charge this circuit alone during the day, the noise being present. Several of the other circuits serving the territory between the disturbed location and the station were charged individually and each proved to be clear. When the line on which the noise then was known to be located was charged from the emergency rectifier the noise disappeared proving the source to be within the rectifier which normally handled the noisy circuit. These points illustrate the characteristics of noises arising on series lines in that the noise will be heard over the entire circuit. In fact, in the case mentioned the loudest interference was located fully three miles from the source of the disturbance.

Where a large number of series circuits are involved the most effective way to locate trouble is by a process of elimination, working at a time when the circuits may be charged individually. The second step should be to eliminate the possibilities of rectifier trouble by switching to an emergency rectifier if one is available. The third step is to short out and disconnect such portions of the circuit as possible where loops return to common points. And lastly to isolate such portions of the circuit as cannot be shorted out by grounding to water plugs at convenient places, completely disconnecting the circuit between ground points.

Peculiar Phenomena

Another noise which has been traced definitely to series-circuit trouble is a peculiar steady tapping noise of a frequency varying from 5 or 10 taps per minute to as high as 90 taps per minute. This interference has been particularly trying at times and during the past two years considerable time has been devoted to its location. One particular case was concentrated upon about a year ago and it was established definitely that this tapping noise did not carry far beyond the limits of the given circuit and, further, that the noise commenced from one-half hour to one hour after the circuit was energized. It was found further that this noise was confined to the d.c. series circuits. By pulling these circuits one by one it was found that the noise was cleared when the faulty circuit was killed, returned when it was re-energized and cleared again when the circuit was taken off the line. This precluded any possibility of the disturbance being picked up and carried by the circuit and definitely established that the trouble occurred within the circuit itself.

Two things are of interest here and bring out the difficulties encountered in the final location of this disturbance. Inasmuch as an arc lamp has a drop of potential of approximately 80 volts between terminals and further in view of the fact that there are several reactance coils in the lamp each lamp serves to amplify any noise or signal that may originate on or be superimposed upon the circuit. The same is true of a transformer and this resonance property now is utilized by the company as an aid and guide in tracing trouble. Until this property was understood it was a source of almost hopeless annoyance. As a matter of fact this property gives rise to the popular idea that the transformer or arc lamp is causing trouble. On the circuit just mentioned the tapping could be heard under each lamp in the circuit and adjacent to each transformer within the area covered by the circuit, but rapidly died out as the boundaries of the circuit were crossed. It so happened that in so far as could be determined the noise was loudest under a 20-kw. transformer located two spans from the first lamp on the positive end of the circuit.

Immediately following this activity this d.c. circuit was eliminated and combined with other circuits on a general street-lighting rearrangement, then in progress, to form 6.6-amp., a.c. circuits with 400-cp. lamps. After this work was completed the noise had disappeared.

Later this trouble was traced definitely to the lamp itself. It was found that this could not be determined within four or five lamps either way of the lamp in question due to the inability of the ear to distinguish differences in volume of noise heard at different locations. By lowering the lamps, shorting them out and completely disconnecting them from the circuit, a lamp was located which, when disconnected, eliminated the disturbance. It is curious to note that the same regular ticking that was heard in the radio set was audible to the ear when standing within three feet of the lamp. When the lamp was shorted out the noise stopped in the radio set, but still was audible to the ear. With only the positive wire disconnected from the lamp the ticking stopped. With the positive wire on and the negative disconnected the ticking continued, but when the negative wire was resting on the metal hood the ticking stopped.

The exact cause has not been determined up to the present writing, but it is probable that a spark passed regularly between the winding and case, as fast as the static charge leaked off the case into the atmosphere. This accounts for the apparent effect of weather changes upon the variation in frequency of the ticking as had been noted previously. No doubt it is the case that this is in effect parallel to the old spark-gap radio telegraph transmitter. With the passage of each spark a radio-frequency oscillation was set up in the circuit due to its inductive and capacity characteristics, the oscillation commencing with relatively large amplitude and rapidly dying out due to the resistance of the circuit. Oscillations of this character are termed wave trains, one wave train being produced by each spark. The telephone receiver cannot follow the rapid changes of radio-frequency vibration and is actuated only once for each wave train, or once for each time a spark passes within the lamp. This also is strictly the case where a disturbance is produced by sparking on a.c. lines. Since in alternating current the voltage becomes zero and builds up to a maximum 120 times each second, 120 separate sparks occur each second each producing a train of radio-frequency waves actuating the receiver once for each wave train. This occurence has given rise to the term "60 cycle buzz."

A wave train consisting of a radio-frequency vibration which rapidly decreases to zero is different from the radio-frequency wave sent out from a broadcasting station only in that the broadcast waves are "undamped" or constant in amplitude of vibration. Undamped waves first were utilized by means of a d.c. arc in circuit with suitable inductance and capacitance. This method still is used by some of the larger commercial and navy stations in telegraph work. Though d.c. street-lighting circuits consist of d.c. arcs in circuit with a certain amount of inducance and capacitance it is doubted whether radio-frequency waves are produced by this combination under normal operation inasmuch as the arc generator is unstable in operation in radio work unless certain auxiliary conditions are maintained. At least, if radio-frequency waves are produced by this combination no interference to broadcast reception has been noted thus far. The number of faulty arc lamps located thus far in Denver is less than one-half of one per cent.

Another noise on the d.c. series circuits will cause much grief to interference tracers. This is a loud pure-toned hum which occurs in all cases at a frequency of about 60 cycles. It is very loud on the tracing sets in use when they are placed adjacent to or immediately under a lamp and decreases to one-half or one-third this intensity when 30 or 40 ft. away. Also it is louder at certain lamps than at others. Further, it was found that reception on 5 or 6-tube sets in the immediate locality was absolutely clear, which led to the conclusion that such noise was of an audio-frequency nature only.

Frequently calls have come in reporting cases where the noise received on a 5 or 6-tube set was so weak that it scarcely could be heard on our 3-tube loop test set. In such instances a large amount of time usually is lost in tracing the trouble into a louder territory. In these cases we now utilize the resonance properties of transformers and arc lamps as a guide. In cases where the loudest point is difficult to determine, as is true of the tapping noise and disturbances on the 13-kv. service, an audibility meter giving some visual means of measuring the intensity of noises would be of material aid and should save much time.

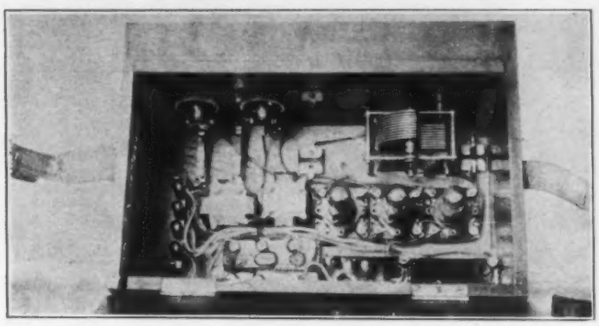
A radio set for use in tracing interference should be as compact and light as possible consistent with reasonable amplification. A set designed for loop operation is to be preferred to one utilizing antenna pick-up in view of convenience and portability rather than the inherent directional properties of a loop, the errors of which already have been pointed out.

In general then the following points will be found to hold true:

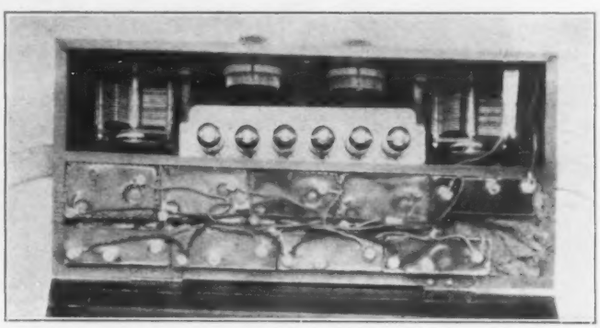
1. Radio-frequency interference arises wherever an arcing condition has been established causing oscillation of the supply circuit due to its inherent properties.

2. The supply circuit oscillates chiefly along the route of the current flowing to the fault since service taps, insulators, etc., supply paths for dissipation of the radio-frequency currents, damping out oscillations in other portions of these circuits.

3. It follows that disturbances of this nature are defined sharply as to location when occurring on lines supplying service to customer's premises directly, whereas noises become more general on higher voltage lines where service or branch-line taps are less frequent.

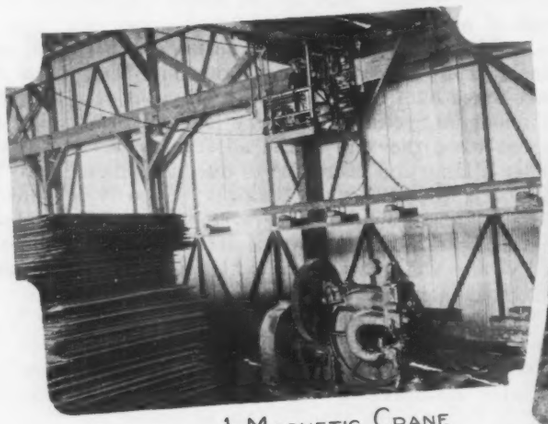


Portable Hartley circuit for use with loop in interference testing.



Special portable superheterodyne set for location of radio interference sources.

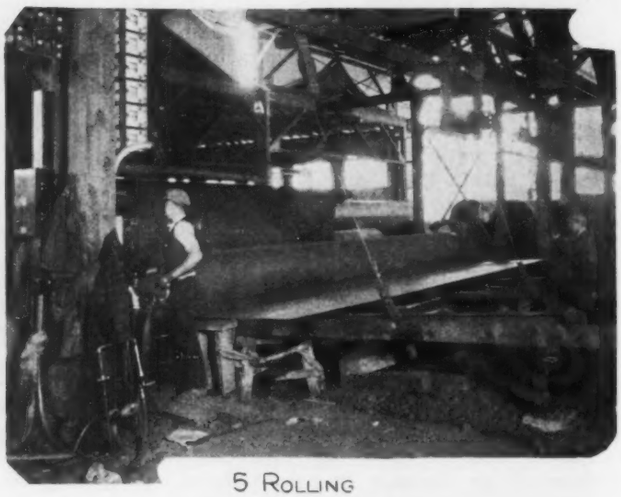
Successive Steps in Producing



1 Magnetic Crane

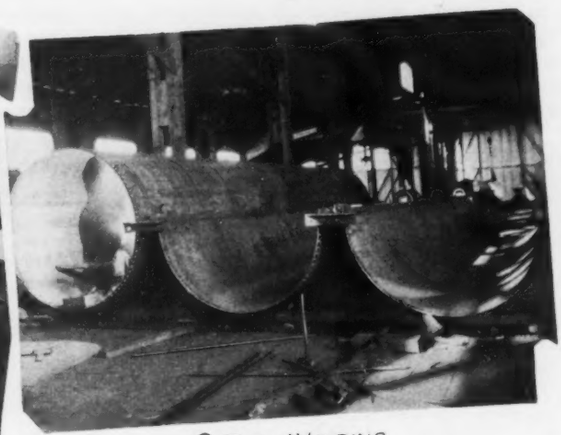
4 Crimping

2 Punching



5 Rolling

3 Straightening



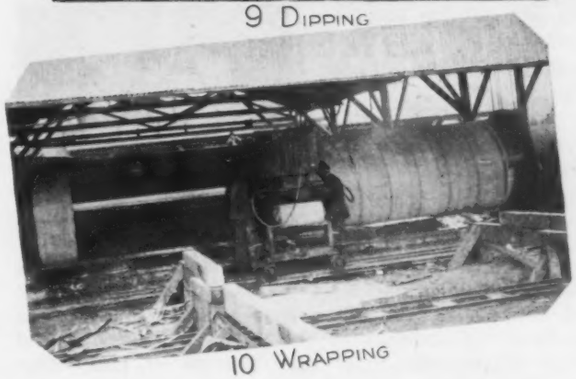
6 Tack Welding

Electrically Welded Steel Pipe

7 Finish Welding

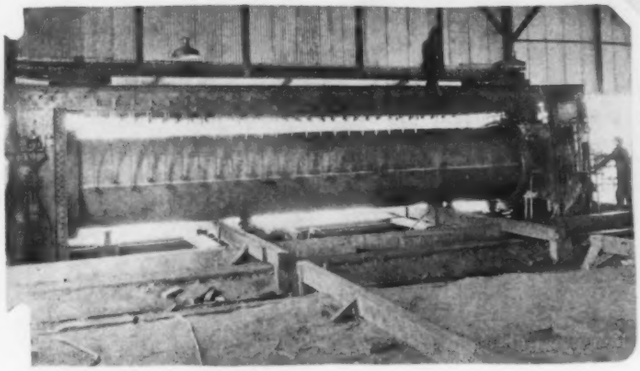
9 Dipping

SHOP processes in the fabrication of 90 miles of 65-in. steel pipe for the Oakland, Calif., Mokelumne water-supply project are shown in the accompanying views. Eight Lincoln electric welding machines are producing from 24 to 36 30-ft. sections per day. After punching, straightening and rolling, the half sections are assembled in pairs and tack-welded along the two longitudinal seams. The assembled section then is placed in the electric welding machine and clamped in place by a mandrel. The seam to be welded is placed at the bottom resting upon a grooved water-cooled copper fire strip, the groove being used to control the formation of a bead on the outside of the pipe. Next a ¼ x 2-in. steel strip is placed over the seam and the top water-cooled coppers clamped closely along either side. The special carbon-arc welding head travels automatically along the mandrel inside of the pipe at a speed of about 12 ft. per hr. for ½-in. pipe. Current passing from the electrode through the steel strip causes it to melt and fuses the molten metal to the two edges of the seam. When fusion is perfect a ½ x 3/16-in. bead forms along the inside of the seam and fills the bead groove in the fire-strip along the outside.



10 Wrapping

11 Shipping



8 Testing

Should GOLF *be Utterly Cryit*

Promotes self control or wrecks it.

As a means of girth control—

THE SCOTCHMAN pronounces it "gowff." The doctors pronounce it harmless, and the wives pronounce it the greatest present-day menace to domestic peace and happiness. As a means of girth control, it will reduce the waist measure unless the subject is so far gone in that direction as to have effected a permanent set. It aids digestion, substitutes muscle for fat, and promotes self-control or wrecks it, depending upon individual temperament and viewpoint. It shows up man in the raw for what he really is, for the golfer who counts all his strokes, who is considerate of his opponent, who can take a succession of bad breaks with a smile, and who can pay his losses without crabbing, will make a good employee, a good friend, a good husband and father.

Gets his kick out of admiring his tools.

A despairing, aspiring and perspiring golfer was heard to remark, "the object of the game consists in attempting to hit a very small ball into a series of very small holes in the smallest possible number of strokes, using for the purpose sundry and various implements ill-adapted for the purpose." Sundry and various implements—truly they are all of that, with names that in themselves mean nothing at all, and convey little or no information as to their purpose. Whence came the nomenclature applied to golf clubs, nobody knows. What could be more inane, or inept than brassie (pronounced with the broad *a* by the best people), cleek, putter, mashie, jigger and niblick? Then we have the hybrids, like the Sammy and the hermaphrodites such as the mashie-niblick.

One man living not far from here has six complete sets of clubs, with bags and appurtenances, and who, if he lives to be as old as Methusaleh himself will never progress beyond 24 handicap. And how he does love to play with his toys, for toys they are, and what a really innocent, almost childish pride he takes in his perfectly designed golf equipment. And, since his golf is hopelessly rotten, he gets his kick out of admiring his tools. The kick is the thing; if you get it, you have had your money's worth, and more.

So golf (in its older form, *goff*, *gouff*, or *gowff*, the last name giving the genuine pronunciation) has become so inseparably woven into the industrial structure of the United States of America, as to cease to be regarded as a mere game. It has become an institution.

Everybody's doing it. Many are overdoing it, in truth it has been sagely remarked that if one goes around over 90, he is neglecting his golf. If he goes under 90, he is neglecting his business. And this prompts the question: Is golf an adjunct of business, or is business an adjunct of golf?

These questions are neither new nor peculiar to the present day and age. From an enactment of James VI, then James I of England, bearing the date 1618, a protective tariff was decreed to prevent the increasing importation of golf paraphernalia from Holland, of all places. Perhaps the peculiar cut of the bifurcated garments affected by Dutchmen were the forerunners of the plus 4's, 6's, or 8's with which modern devotees of the sport drape their nether extremities.

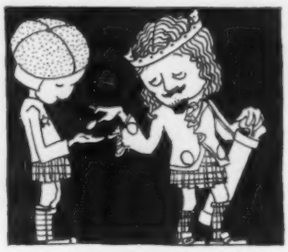
It was in March, 1457, that the Scottish Parliament "decreted and ordained that wapinshawingis (whatever that means) be halden be the lords and baronis spirituale and temporale four times in the zier, and that the fute-ball and golf be utterly cryit down and nocht usit." Alas for the best laid plans of the lordis and baronis, the golfers of the day were adamant, so it became necessary again to convene Parliament some four months later, only to have its decrees flouted, so some more laws were passed by those fifteenth century reformers and a statute was passed entitled, "Fute-ball and Golfe Forbidden,'" in the text of which both were designated as "unprofitabill sportis," and a fine of 14 shillings was imposed for their infraction. In passing, it is interesting to note that his Gracious Majesty himself broke his own behest, not once but several times, and paid his fines like a gentleman and a sportsman, to the enrichment of the accounts of the Lord High Treasurer of Scotland.

There is no use trying to "cryit down" golf. Therefore let us consider whether there may not be some by-products of this "unprofitabill sport," some compensating benefits that may show a black-ink balance in the loose-leaf system maintained by the recording angel, who must indeed have to put on more help over week-ends, holidays, and convention periods.

Importation of paraphernalia from Holland.

Freud might be able to tell us to which of the two basic human instincts is traceable the impulse to swat a little ball a mile, and really it makes no difference. The fact remains that the impulse is there; it is irresistable in one form or another, and as for the few who hold themselves aloof from this most fascinating of all sports, their only place in this world is in the Smithsonian Institution as exhibits for the amusement of the curiosity seeker.

Perhaps the most pronounced characteristic of golf is its all-revealing effect. Play a round of golf with a man, and you will know him, inside and out. A hole or two, a few bad shots, a cuppy lie, a ball nestling snugly in a heel print in a bunker, and away goes the thin veneer of civilization. One



King James paid his fines like a gentleman.

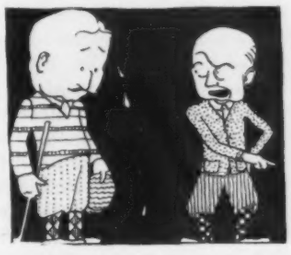
Down and Nocht Usit?

need not sign the handy coupon on the dotted line to become a forceful speaker. Follow an average foursome any Saturday afternoon, use your ears, and enrich your vocabulary to an extent unattainable by any other means.

Golf is a great leveler of social distinctions. The haughty potentate who runs his business like a Czar before whom all luckless employees tremble is an interesting spectacle as he stands in perspiring humility taking a vigorous bawling out from some weazened little pro because he cannot keep his eye on the ball. Truly a permanent inferiority complex is induced within the fat, middle-aged golfer at the sight of some twenty-year-old youngster whose beautiful free swing apparently without thought or concentration sends the little white pellet 250 yards straight down the fairway. And then Mr. Industrial Magnate puffs and blows like a grampus, nearly bursting a blood vessel with his terrific efforts and sends the suffering ball 75 yards or so followed by a divot as big as the state of Rhode Island.

It is a wonder that more personnel managers do not use golf as an X-ray and take a peek at some of their men as they really are. All of those psychological and efficiency tests, wherein a man who can write the name of the capital of Teheran in the third square from the upper right-hand end in a fraction of a second is determined to be a natural-born plumber or violincellist cannot begin to present the revealing picture painted by a round of golf on a windy day.

There is more to this golf game than a pleasant excuse for leaving the office early on Saturday. It has invaded our business lives to an extent scarcely appreciated by the business man himself. Take our conventions, for instance. Imagine a convention or meeting, however small, that is not accompanied by anything from a friendly foursome to an elaborate tournament with all kinds of cups, flight prizes, and even a Calcutta pool preceding the event. The very few who do not play themselves regard the golfing activities at business meetings with a jaundiced eye. They rail and sneer at golf as a piffling pastime encouraging an unseemly and undignified levity on the part of the conventioneer, as a waster of precious time that had better be devoted to the serious purpose of the convention, and the golfers themselves in the same light as a hookey-playing youngster shaking off his responsibilities to his fellow man.



The Czar of business takes it from the pro.

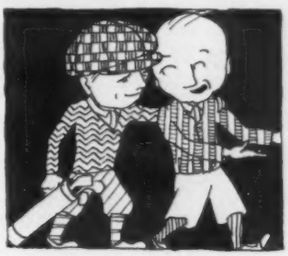
A permanent inferiority complex induced—

To the unprejudiced observer, and who is unprejudiced on this universal subject, the golfing activities at conventions probably accomplish a considerable part of the primary purpose for which the convention is called. When business competitors get together on the golf course there is developed an atmosphere of friendliness, camaraderie and tolerance of the other fellow's viewpoint that can be accomplished by no other means. The influence of this delightful association is carried into the formal conferences; it promotes a spirit of co-operation and provides a common ground that smooths out the wrinkles from human relations. After all, human relations are what really count, and any factor that makes us less selfish and more considerate of the other fellow is a useful adjunct in our lives.

Substituted sox appeal for sex appeal.

We took our entertainment by proxy.

What did we do before the advent of the golf craze? We took our amusement by proxy. We went to the theater, or the ball game, and watched a band of hired entertainers disport themselves before us while we munched chocolate creams or peanuts in comfort on the plush seats of the orchestra or the wooden bleachers of the ball-park. Now we have substituted sox appeal for sex appeal, and think more of encasing our manly limbs in a selection of all-wool Scotch imported golf hose in screaming checks or plaids than of the antics of some eye-and-ear Broadway attraction.



Primary purpose for conventions.

Golf has become the greatest asset in our social lives. Entertaining is a distinct part of business, and is so recognized by industrial leaders the world over. At one time there was a variety in what the business man had to offer to his customers to whom he felt inclined to show some social attention. Dining and wining plus the theatre, an endless iteration and reiteration of the same old stuff, that was all. The dining is still with us, the wining not too much, and the drama is changing with the times into something almost prohibitively expensive and rarely worth what it costs, or anything like it. But what is so rare as a day in June, a cloudless sky, a little white ball poised expectantly upon a pinch of sand, when: *Crack!* Away it sails, straight down the fairway? Perhaps.

Public relations prefer golf. Say what you will, it is like nothing else for breaking the ice, cementing friendship, is the essence of true hospitality and is the best substitute for the famous remark, now obsolete, attributed to the Governor of South Carolina when addressing the Governor of North Carolina. What shall it profit a man if he gain the whole world, and yet fail to perpetuate his youth by taking advantage of the opportunity presented by this grand old game?

—*Charles T. Hutchinson.*

Lamp Sales Campaigns of Three Northwest Companies

By Berkeley Snow
Northwest Editor, Electrical West, Portland, Oregon

BURNED out lamps with resulting empty sockets in the home are the cause of considerable lost revenue to the central station. Three Northwest power companies in an effort to overcome this situation engaged in lamp sales campaigns featuring a carton of six 60-watt lamps. Employees did most of the selling and the results, as indicated in this article, were most gratifying.

WHAT happens when a lamp fails in the home of Mr. Average Customer? Being familiar with the domestic arrangements for keeping a supply of household operating necessities in one home only, I cannot answer that question, but I am willing to agree that the guesses of those that have given the matter some thought are substantially correct, and that what ordinarily happens is that one of the household is dispatched to rob some other socket to the tune of a family dispute as to who is responsible for seeing that there is a supply of spare parts on hand. Of course the robber chooses some little-used socket from which in his opinion the lamp will not be missed for some time, thus postponing the day of reckoning, but with each additional lamp failure the robbing of sockets becomes more complicated, and we, as observers of human nature, can imagine the situation becoming so aggravated as shockingly to threaten the peace and happiness of the family. No less than two popular cartoonists, Briggs and Gluyas Williams, have treated the subject, each in his own inimitable way, which indicates that the problem is recognized outside of the electrical industry and is of some consequence. It wouldn't surprise us much to hear of some zealous guardian of the public morals attempting to legislate about it in the interest of a more widespread domestic felicity.

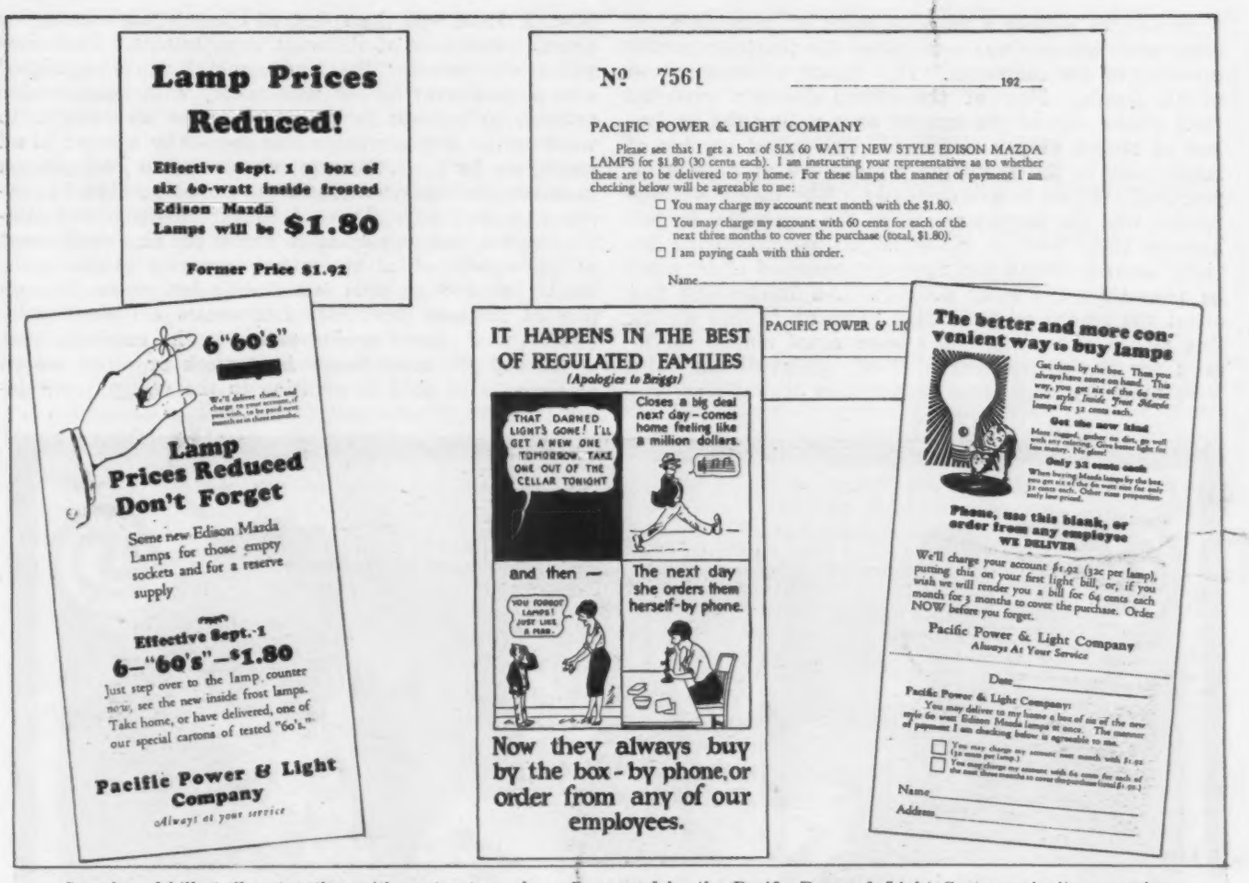
Now the truth is that we of the electrical industry are not interested in domestic felicity as an end in itself. Rather, we are interested in it as a means to an end, since we frequently base our appeal in selling household devices on the fact that they will improve conditions in the home. We are glad to think that through intensive sales activities on these devices we have been influential in improving conditions immeasurably, and that, when we have high-pressured a customer into buying an appliance that eases the burden of housekeeping, we have, in fact, done him a good deed; but like all other business men we are primarily interested in the sale of our product. Thus the problem of empty lamp sockets is not for us so much a social one as a business one, and, as it presents itself to the power companies, it finds expression in these three questions: To what extent are there empty lamp sockets in the home of Mr. Average Customer? How much revenue are we losing on account of them? How can the situation be corrected or improved?

Answering the first two questions in general by saying, "Considerable," three companies in the Northwest started out to find the answer to the third by applying extra effort to lamp sales in the form of a campaign. These three compaigns, varying from one to four months in duration, were conducted in the fall of 1926 by the Pacific Power & Light Company, the Northwestern Electric Company and the Idaho Power Company. They were planned and executed respectively by V. H. Moon, appliance sales superintendent for the Pacific company, J. B. Buman, appliance sales manager for the Northwest company, and L. W. Brainerd, superintendent of appliance sales for the Idaho company. All report excellent results.

While the local significance of the campaigns was of first importance to the companies concerned, it is true that the campaigns fitted nicely into the plan of the Edison Lamp Works for introducing the new 60-watt inside frosted lamp. Desiring consumer acceptance of this new lamp, and also a reduction in the stock of old lamps, this company instituted its "Behind the Line" contest of nation-wide scope. As an aid in the contest, this lamp manufacturer advocated that its agents feature the new lamp in a so-called "6-60 Campaign," intended to indicate that the 60-watt lamps should be sold by the carton of six. All three campaign managers above mentioned tied in with this idea, using some of the sales helps offered by the Edison company, and all were well pleased with the co-operative support given by local agents of that company, J. Hampton and S. B. Lowenberg in the Portland territory and E. L. Dee in Idaho.

Several substantial cash prizes were offered by the Edison company in its "Behind the Line" contest in each of the territorial districts into which the country was divided. It is interesting to note that two of the Northwest campaigners, through the results of their campaigns, were major prize winners in this contest: Mr. Moon in the Portland district and Mr. Brainerd in the Rocky Mountain district. In addition Mr. Moon won the grand prize for the entire West. Mr. Buman did not enter the contest.

In certain respects all three campaigns were similar. Each featured the new lamp to be sold by the carton; each offered to deliver the purchase to the home of the customer and to receive payment either in cash, or in one payment with the next month's light bill, or in three equal monthly payments; each planned to make sales principally through regular employees outside of the sales force; each established a straight commission plan of remuneration for employees entering this activity, which was expected to be carried on in addition to the employee's regular work; and each used some method to stimulate rivalry and competition among employees between districts or departments. However, certain differences in planning and conducting the campaigns are apparent to the observer and can best be brought out by taking up the principal features of each in turn.


Lamp Prices Reduced!
Effective Sept. 1 a box of six 60-watt inside frosted Edison Mazda Lamps will be $1.80
Former Price $1.92
6 "60's"
Lamp Prices Reduced Don't Forget
Some new Edison Mazda Lamps for those empty sockets and for a reserve supply
Effective Sept. 1
6—"60's"—$1.80
Just step over to the lamp counter now, see the new inside frost lamps. Take home, or have delivered, one of our special cartons of tested "60's."
Pacific Power & Light Company
Always at your service
No 7561
PACIFIC POWER & LIGHT COMPANY
Please see that I get a box of SIX 60 WATT NEW STYLE EDISON MAZDA LAMPS for $1.80 (30 cents each). I am instructing your representative as to whether these are to be delivered to my home. For these lamps the manner of payment I am checking below will be agreeable to me:
☐ You may charge my account next month with the $1.80.
☐ You may charge my account with 60 cents for each of the next three months to cover the purchase (total, $1.80).
☐ I am paying cash with this order.
Name
IT HAPPENS IN THE BEST OF REGULATED FAMILIES
(Apologies to Briggs)
THAT DARNED LIGHT'S GONE! I'LL GET A NEW ONE TOMORROW. TAKE ONE OUT OF THE CELLAR TONIGHT
Closes a big deal next day—comes home feeling like a million dollars.
and then —
YOU FORGOT LAMPS! JUST USE A PLUG.
The next day she orders them herself-by phone.
Now they always buy by the box-by phone, or order from any of our employees.
PACIFIC POWER & LIG
The better and more convenient way to buy lamps
Get them by the box. Then you always have some on hand. This way, you get six of the 60 watt new style Inside Frost Mazda lamps for 32 cents each.
Get the new kind
More rugged, gather no dirt, go well with any ordering. Give better light for less money. No glare!
Only 32 cents each
When buying Mazda lamps by the box, you get six of the 60 watt size for only 32 cents each. Other sizes proportionately low priced.
Phone, use this blank, or order from any employee
WE DELIVER
We'll charge your account $1.92 (32c per lamp), putting this on your first light bill, or, if you wish we will render you a bill for 64 cents each month for 3 months to cover the purchase. Order NOW before you forget.
Pacific Power & Light Company
Always At Your Service
Date
Pacific Power & Light Company:
You may deliver to my home a box of six of the new style 60 watt Edison Mazda lamps at once. The manner of payment I am checking below is agreeable to me.
☐ You may charge my account next month with $1.92 (32 cents per lamp.)
☐ You may charge my account with 64 cents for each of the next three months to cover the purchase (total $1.92.)
Name
Address

Samples of bill stuffers together with contract purchase form used by the Pacific Power & Light Company in its campaign.

Pacific Power & Light Company

In the case of the Pacific Power & Light Company, the commission paid employees was 40 cents per carton for sales outside the office and 25 cents on sales inside. Each employee was furnished with an order blank containing ten orders for one carton of the new lamps. A copy of the order was to be retained in the book, and the presentation at the office of the completed book entitled the employee immediately to either $4 or $2, as the case might be.

The humorous element of the domestic situation in the home where a lamp has burned out was featured in all the advertising. On the backs of the envelopes carrying the Sept. 1 bills was pictured the "Mr." and "Mrs." of the Briggs comic strip indulging in a little family repartee, while the caption announced, "An answer to something that happens in the best regulated families. See inside." The insert referred to on the envelope showed the Briggs comic strip on one side, and a statement of the lamp offer with an order blank on the other. Another piece of advertising was a slip stating the proposition, which was to be handed out by employees at the cashiers' windows and other contact points. Some of the advertising novelties offered by the Edison Lamp Works were also used, for instance a keytainer or a tape measure was given away with every carton purchased. Two window trims, for use in all district offices at different periods of the campaign, were prepared and sent out from the Portland office in accordance with the company's custom of using standardized trims in all campaigns tying in with the other advertising done. These also featured the Briggs characters in another domestic situation with respect to keeping a lamp supply in the home. Banners were prepared to be placed on company cars and in store interiors and windows. No newspaper advertising was used.

The New Edison Mazda Lamp
Buy your Lamps NOW for the Long Winter Evenings
The NEW inside-frosted Mazda Lamp protects the eyes because it diffuses the light better. Does not collect dust — frosted inside. Sturdier and more attractive than the old Lamps. The latest development of research in the Laboratories of the GENERAL ELECTRIC CO.
Here's Our BIG OFFER:
Six 60-watt lamps at the new reduced price of $1.80, put on your light bill in three equal payments of 60c per month. This is a SERVICE for your CONVENIENCE, giving more healthful lighting at nominal cost on easy terms.
Fill out the attached card and mail —we will do the rest
Tear off here and Mail Today
EMPLOYEES' LAMP SALE CONTEST
IN THE INTEREST OF BETTER LIGHTING
Sale Ends November 1st
ORDER BY CARTONS
PLEASE SEND TO MY HOME ..... CARTONS (Each containing 6 lamps) OF
Must be six lamps
THE INSIDE-FROSTED MAZDA LAMPS AND CHARGE TO MY ELECTRIC BILL IN THREE MONTHLY PAYMENTS.
Signed ..... Customer
Number ..... Street
Credit Sale to Mr. ..... Employee
Department or Occupation .....
NORTHWESTERN ELECTRIC COMPANY
LIGHT POWER HEAT
If you wish, you may phone order, and sign card at time of delivery.

Sample of advertising material used by the Northwestern Electric Company.

By way of setting a mark to shoot at, a quota of 50 cents per customer was established for the four months duration of the campaign. This meant a sale of about 62,600 lamps. Five of the fifteen districts exceeded their quota, one of the smaller ones selling the equivalent of almost $1 per customer. The actual number of lamps sold in the campaign was 47,480 at a value of practically 38 cents per customer. The month of September was the largest month in the campaign, largely because there was no other major merchandising activity on that month and more concentrated effort could be placed on the lamp activity. An interesting fact about the record made by this company is that during this month alone lamp sales were equal almost to the sales for the entire year of 1925. Most of the sales were made by employees rather than through returns from the direct-mail advertising. The best sales records were made by meter readers, service men and cashiers, one meter reader reciving $127 in commissions for one month's sales.

Window display used by Pacific Power & Light Company.

The campaign made a small merchandising profit, but other benefits from it far exceed any possible profit that might be expected, according to Mr. Moon. It is believed that many of the lamps sold went into empty sockets, that the average wattage per socket was somewhat increased, and that many customers were educated to keep a supply of spares on hand. This method of selling lamps was so successful, and the good derived from the activity was so marked, that the campaign is to be continued throughout the year 1927, though in less concentrated form and with smaller commissions being paid.

A feature of the campaign of the Northwestern Electric Company, which lasted one month, from Oct. 7 to Nov. 7, 1926, was the spirit of competition engendered among employees of different departments. The campaign was called "The Employees' Lamp Campaign," and a particular effort was made, with considerable success, to interest as many employees as possible to work on it. The campaign was opened by a letter to all employees by L. T. Merwin, vice-president and general manager, calling attention to the campaign then in progress in the Pacific Power & Light Company, and challenging his own employees to better the accomplishment of the employees of the sister company. Department heads followed up this letter with letters to the employees in their departments to create a little healthy rivalry, and offered special prizes to the employee that would sell the most lamps in a week or other period of time, to be paid in addition to the regular commission of 6 cents per lamp. To keep the matter always before the employees, charts showing a thermometer in which the mercury raised with each day's sales were posted in many prominent places throughout the building and shops. Frequent bulletins from the appliance sales department likewise tended to keep up the interest.

The advertising devoted to the campaign consisted of one newspaper advertisement, one post card with return card attached on which lamps could be ordered, sent to 20,700 customers in residential districts, and one slip calling attention to the offer, to be handed out to customers entering the office. Window trims during the month displayed the new lamp to tie in with the campaign. Though mail order returns from the post cards were not great, it was thought that the advertising secured through this medium was well worth the expense.

Another significant feature about this campaign was that it was used to introduce the lamp business into the activities of the company, which had not heretofore sold lamps. Though other size and type lamps were sold, only sales of the new 60-watt inside frosted lamp were counted in the campaign and credited to employees for commissions. A quota of 14,000 of the new lamps, or a little less than one lamp per residence customer, was established at the begininng of the campaign and was reached in the first three weeks. A total of 17,878 were sold in the campaign period. The best individual records among employees' sales were made by two cashiers, one of whom received $217, and the other $139 in commissions. All departments, however, were widely represented in the final results, sales having been made by many different employees.

An interesting analysis of the revenue value of the campaign was made by Mr. Buman. Considering the average wattage of residence lamps to be 40, each 60-watt lamp put into immediate service would represent an increase in load of 20 watts. Estimating that one-half of the lamps sold in the campaign were put into immediate use, he finds the load added to be 178.78 kw. At an average daily use of one and one-half hours, this would yield a daily consumption of 268 kw-hr., or in a year 96,480 kw-hr. Applying to this the average revenue per kw-hr. for domestic lighting he arrives at an estimated annual revenue secured by the campaign. It is pointed out that these figures do not take into consideration the number of lamp sockets that were empty before.

Idaho Power Company

In the campaign of the Idaho Power Company, extending over five weeks, two newspaper advertisements were used, an advertisement was printed on the back of the month's bills, an order blank was mailed with the bills, and window displays tied in with the other advertising. Here, again, small returns were received from the direct-mail advertising, the real results having been secured through solicitation by the employees, who were paid 25 cents per carton. Meter readers, cashiers and service men made the best records, one meter reader being high with sales of over 400 cartons.

During the campaign the lamp sales were more than double those of the same month the year previous, and it is estimated that the campaign increased the year's sales by 20 per cent. It is a significant fact that there was no diminution in lamp sales in the months immediately following the campaign, sales continuing to show an increase over those of the same months the previous year. This shows that the market was not flooded during the campaign, but that the lamps sold then went largely into empty sockets.

Conclusion

The conclusion that we are forced to draw from these activities is that they were worth while. No one of the three reported making much merchandising profit from the campaigns, but all stated that the activity paid for itself, and all were enthusiastic as to the benefits derived. If anyone chooses to take issue with Mr. Buman's method of figuring the increased annual revenue —and no doubt the method is subject to those differences of opinion arising wherever a number of variables must be estimated—let him make his own estimate based on the sales shown. While doing this let him have in mind Mr. Brainerd's proof that many of the lamps went into empty sockets, and he will be sure to arrive at some substantial figure for the increase in revenue. Certain it is that a greater than average number of customers on the lines of these companies have completely filled lamp sockets and a few extras to take care immediately of the inevitable burn-out, and at the most conservative of estimates this situation cannot fail to produce some added revenue.

Completed and Projected Development of the San Joaquin River

By F. E. Bonner

District Forester, United States Forest Service, Representing the Federal Power Commission, San Francisco

THE completed and projected works on the San Joaquin River comprise an outstanding example of complete utilization of water resources for power and other beneficial purposes. In gigantic proportions, boldness of design and extraordinary construction problems, these developments are without parallel. Recent progress has been so rapid that it is becoming increasingly difficult for those not in close contact with the work to maintain a clear conception of the complex relations existing between the various units.

The developments are divided naturally into four groups as follows:

1. Crane Valley system of the San Joaquin Light & Power Corporation.
2. Big Creek project of the Southern California Edison Company.
3. West Side project of the Southern California Edison Company.
4. Irrigation developments on lower river.

The hydroelectric power developments comprising the first three groups are shown in general outline on the accompanying sketch map, designated Fig. 1, while on Fig. 2 are shown, in graphic form, some of the major details of the Crane Valley and the Big Creek systems.

The Crane Valley System of the San Joaquin Light & Power Corporation makes complete use of the power potentialities of the West Fork, and with the Kerckhoff plant develops 350 sec-ft. of head available on the main river immediately above the large capacity irrigation reservoir planned on the lower river. All these plants of the San Joaquin Power Corporation have been in operation for some time. The San Joaquin No. 1 plant was the pioneer power house on the river, being completed in 1896, while the most recent addition to this system of the corporation is the Kerckhoff plant, which was placed in operation in 1920. The Crane Valley system is supported by storage provided by the Crane Valley reservoir, and in addition, the Kerckhoff plant benefits by the regulation from the storage works of the Edison company. In the aggregate, the Crane Valley system (including Kerckhoff) has an installed capacity of only 66,775 kva., but under normal conditions the dependable output is around 300,000,000 kw-hr. annually, or sufficient to meet about half the present requirements of the entire San Joaquin Valley.

The Big Creek project of the Southern California Edison Company is, of course, one of the most noteworthy developments of the country. It was begun in 1911, and since then the construction has proceeded steadily in orderly progression. The basic scheme of the development takes advantage of the great bend of the South Fork of the San Joaquin River to divert the runoff from 320 square miles of headwaters to the Big Creek drainage where the abrupt drops offer favorable locations for the power plants. Moreover, the Big Creek locality provides considerable additional water

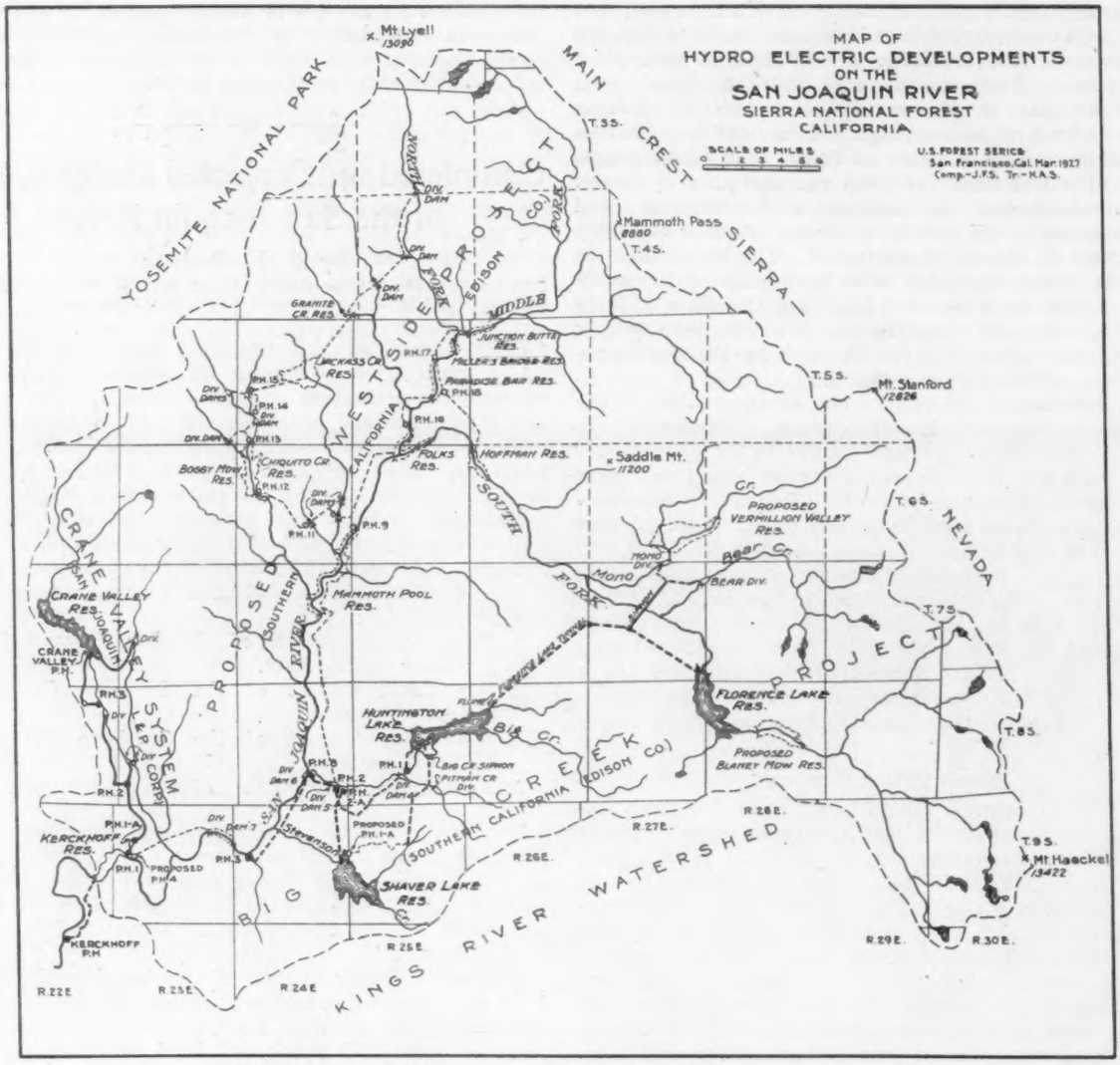


Fig. 1. Map of San Joaquin River drainage basin showing power development.

supply, and offers some attractive reservoir opportunities which unfortunately are lacking on the main stream. By the construction of a multiple arch dam over 3,000 ft. long, 65,000 acre-ft. of storage capacity has been provided at Florence Lake which affords some degree of regulation at the main diversion.

From the diversion at Florence Lake, the water is transported through the intervening mountain range by the Florence Lake tunnel to Huntington Lake. This great tunnel is 13 miles long and 15 x 15 ft. in cross-section. Near the upper end it is joined by the inverted siphon which brings the water across the South Fork canyon from Mono and Bear Creeks.

Huntington Lake reservoir, with 88,000 acre-ft. of capacity is formed by three dams and is located at the upper end of the chain of power plants. From Huntington Lake, water may be routed either through the Big Creek power houses No. 1 or No. 2, or via the conduit to Shaver Lake. The Shaver Lake reservoir has a larger capacity than any other on the system, but lacks tributary area, and therefore it will be used primarily to store the surplus available at Huntington Lake. Water from Shaver Lake will be used through Power House No. 2A under maximum head of 2,417 ft., which is higher than any other on the system.

Discharge from the No. 2 and 2A power plants is next utilized through Plant No. 8 and then through Plant No. 3. Plant No. 3 diversion is on the main river and therefore utilizes part of the natural river flow, in addition to the regulated discharge from Plant No. 8. Eventually, it is planned to construct the Mammoth Pool development which will make the river flow available for use through Plant No. 8. Also, to utilize the 400 ft. of head between Plant No. 3 and the Kerckhoff reservoir, another plant designated Power House No. 4 is contemplated.

The works of the project which now are in operation include the Florence Lake and Huntington Lake reservoirs, Florence Lake tunnel and Power Plants Nos. 1, 2, 3, and 8. Work is under way at present on the Mono-Bear diversion, the Huntington-Shaver conduit, Shaver Lake dam and Power Plant No. 2A. It is expected that all of these will be completed and ready for operation by July 1, 1928. There will be then available storage capacity of 292,000 acre-ft. and generator capacity of 350,000 kva. Later, enlargement of Plants Nos. 3 and 8, and the construction of Plants Nos. 1A and 4 will add about 475,000 kva., bringing the total installation of the entire Big Creek project to 825,000 kva.

With the present plants a total static head of 5,533 ft. is developed between the flow line of Huntington Lake,

at El. 6,950, and the tailrace of Big Creek No. 3, at El. 1,400. Big Creek No. 4 power house with 415 ft. head, and Kerchoff with 350 ft., will increase the total static head to 6,298 ft., and thus, each acre-foot of discharge from Huntington Lake will produce about 4,500 kw-hr.

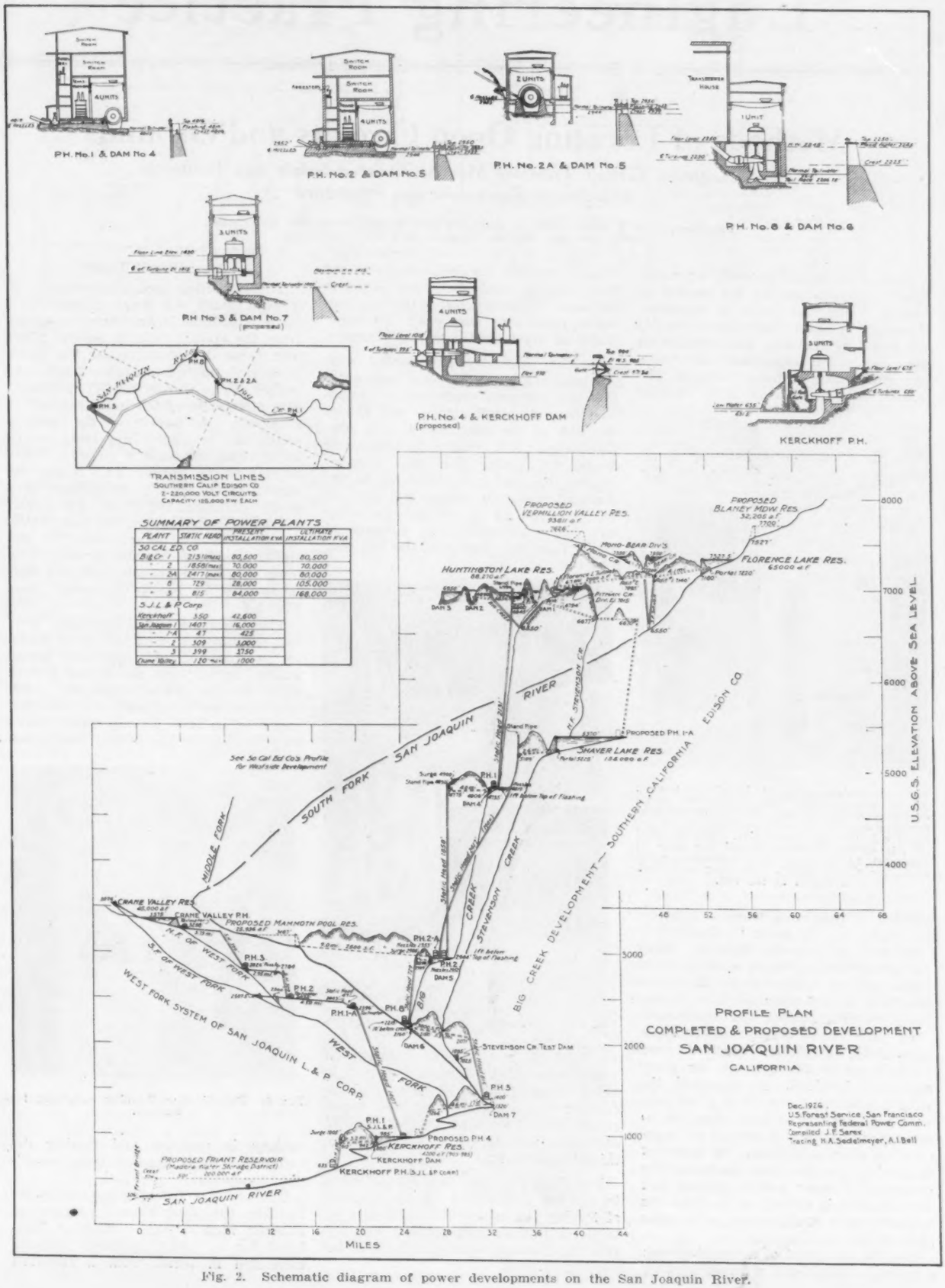

P.H. No.1 & DAM No 4
P.H. No.2 & DAM No.5
P.H. No.2A & DAM No.5
P.H. No.8 & DAM No.6
P.H No 3 & DAM No.7 (proposed)
P.H. No. 4 & KERCKHOFF DAM (proposed)
KERCKHOFF P.H.
TRANSMISSION LINES
SOUTHERN CALIF. EDISON CO
2-220,000 VOLT CIRCUITS
CAPACITY 125,000 KW EACH
SUMMARY OF POWER PLANTS
PLANT | STATIC HEAD | PRESENT INSTALLATION K.V.A. | ULTIMATE INSTALLATION K.V.A.
So. CAL. ED. CO.
Big Creek 1 | 2131 (max) | 80,500 | 80,500
" 2 | 1858 (max) | 10,000 | 70,000
" 2A | 2417 (max) | 80,000 | 80,000
" 8 | 729 | 28,000 | 105,000
" 3 | 815 | 84,000 | 168,000
S.J.L. & P. Corp.
Kerckhoff | 350 | 42,600 |
San Joaquin 1 | 1407 | 16,000 |
" 1-A | 47 | 425 |
" 2 | 309 | 3,000 |
" 3 | 399 | 3750 |
Crane Valley | 120 (est.) | 1,000 |
PROPOSED VERMILLION VALLEY RES.
PROPOSED BLAINEY MDW. RES.
Mono-Bear Div.3
HUNTINGTON LAKE RES.
FLORENCE LAKE RES.
PITMAN CR. Div. Ej. 1915
SHAVER LAKE RES.
PROPOSED PH. 1-A
See So. Cal. Ed. Co's. Profile for Headwater Development
SOUTH FORK SAN JOAQUIN RIVER
MIDDLE FORK
CRANE VALLEY RES.
CRANE VALLEY P.H.
PROPOSED MAMMOTH POOL RES.
N.F. OF WEST FORK
S.F. OF WEST FORK
WEST FORK SYSTEM OF SAN JOAQUIN L. & P. CORP.
WEST FORK
PH.1 S.J.L.&P.
PROPOSED PH. 4
KERCKHOFF RES.
KERCKHOFF DAM
KERCKHOFF P.H. S.J.L. &P. (OWN)
PROPOSED FRIANT RESERVOIR (Madera Water Storage District)
SAN JOAQUIN RIVER
BIG CREEK DEVELOPMENT — SOUTHERN CALIFORNIA EDISON CO
STEVENSON CREEK
STEVENSON CR. TEST DAM
U.S.G.S. ELEVATION ABOVE SEA LEVEL
MILES
PROFILE PLAN
COMPLETED & PROPOSED DEVELOPMENT
SAN JOAQUIN RIVER
CALIFORNIA
Dec. 1926.
U.S. Forest Service, San Francisco
Representing Federal Power Comm.
Compiled J.F. Sarex
Tracing H.A. Sadelmeyer, A.I. Bell

Fig. 2. Schematic diagram of power developments on the San Joaquin River.

Engineering Practice

Methods of Locating Open Circuits and Grounds

Series Lighting Circuit Troubles May be Located Safely and Positively with Simple Equipment and Procedure

By Clayton St. J. Hale, Assistant Superintendent Electric Distribution Department, Pacific Gas and Electric Company, San Jose, California.

Open circuits and grounds on series lighting circuits usually are located by ringing them out with a magneto. However, in some places open circuits are found by charging the circuit with some lower voltage, usually 220 volts, and connecting a lamp between the circuit and the ground in a manner

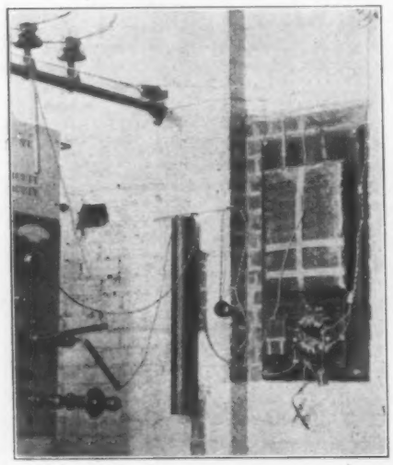


Fig. 1. Station equipment for circuit testing. At the extreme right may be seen the signal device consisting of the large insulating condenser (top), the 110/volt transformer and the spark coil (beneath condenser). One terminal of this device is grounded and the other is connected to a signal bus extending along above the circuit panels. Listening equipment is shown at the left.

similar to that used when a magneto is employed. In some locations it is customary to test the lighting circuit for crosses with primary circuits either by grounding it directly or through a potential transformer at the station before work is started upon the circuit.

In all of these methods there is an appreciable element of risk to the men as well as to the magneto or other apparatus involved. Even though the circuit is found to be clear of crosses with high-voltage circuits there is no assurance that it will remain so, especially in stormy weather. Of course it is possible for the man operating the magneto to wear rubber gloves, but even then it is difficult to so hold the magneto as to avoid contact with some part of the body.

Also, in the event of a cross between a primary circuit and a street-lighting circuit neither the magneto nor the lamp method could be used. Then it becomes necessary to patrol a long series circuit, no very easy task especially at night and in stormy weather.

Another difficulty experienced with the magneto method is that frequently the line becomes energized by induction from adjacent circuits and causes the bell of the magneto to ring continuously. This makes it impossible to tell by turning the crank whether or not the circuit is closed up to the point of test. Of course but one end of the circuit is so affected, the other end being grounded for purpose of test. Thus the ringing of the bell may

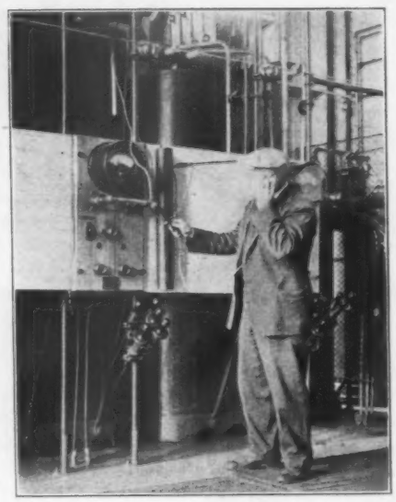


Fig. 2. Method of testing for open circuit in a series lighting circuit. Note the signal bus above the panel, portable condenser hanging on the panel, and operator listening with ear phone.

be used as a signal to indicate on which side of the break the test is being made. This is not a very satisfactory practice, however, and experience has shown that a great deal of confusion and delay is occasioned by this circumstance.

For these reasons efforts were made to develop a safe and reliable method of testing for open-circuits not subject to the objections just stated. The device for locating open-circuits will be considered first.

Open Circuit Tester

The signalling apparatus consists of a Ford spark coil which is energized by a 110/6-volt transformer supplied from the station lighting circuit. Current from the secondary of the spark is carried through a high-voltage condenser to one wire of the series circuit. The other side of the induction coil is grounded. A flasher of the variety which can be placed in a lamp socket is provided to cause a periodic interruption to the signal. This makes the signal more readily recognized and easily distinguished from the sound caused by induction on the line, which otherwise might be mistaken for the signal produced by the buzzer. The lamp is used to provide sufficient load to operate the flasher properly. (See Fig. 1.)

The above mentioned apparatus does not produce the most desirable sound for the purpose. An apparatus which would impress upon the circuit a note of a definite and distinguished pitch very different from ordinary induction would be an ideal arrangement. However, the buzzer has proved very satis-

Fig. 3. Portable type listening equipment for linemen.

factory in practice and further development work has not been considered necessary.

The portable listening apparatus for locating the open circuit consists of another high-voltage condenser insulated for an 11-kv. working pressure connected in series with a standard

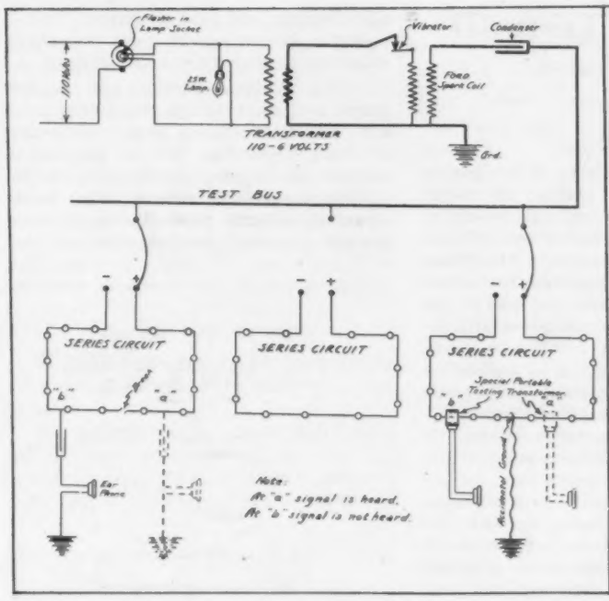


Fig. 4. Wiring diagram for open-circuit tests on series lighting circuits.

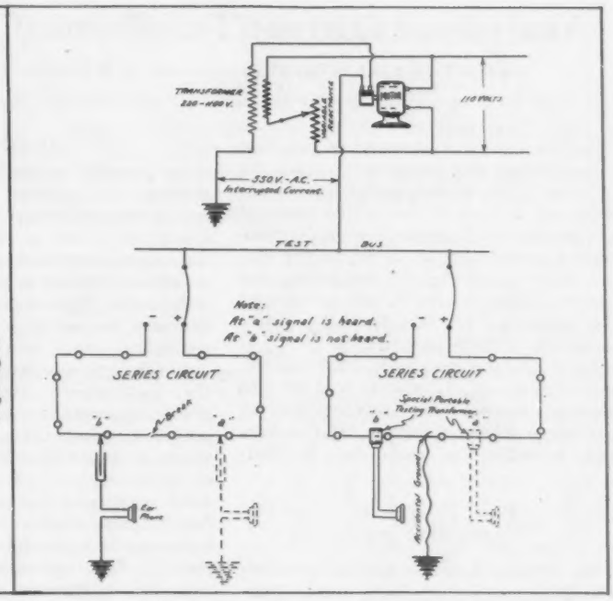


Fig. 5. Alternative scheme for open-circuit or ground tests.

ear phone and thence to ground, when in use. The portable condenser is equipped with a knife for cutting through the insulation of the wires so that the lineman does not have to remove the insulation with his knife. Hence there is no risk while handling the condenser.

The test is made as follows: the signal is applied to one side of the series circuit which has by previous test been found to be open, either by the conventional magneto test or by the use of a similar device at the station. Then the portable apparatus is taken out and tapped onto the circuit at various points. If tapped ahead of the break the signal is picked up readily on the ear phone. If tapped beyond the break the signal is not heard. Thus it is comparatively easy to locate the break in a few tests.

The condenser makes the apparatus safe in that no harm results if a primary wire should by mistake be tapped with the knife of the portable condenser, or if the series circuit should be crossed with a primary wire thus producing the same effect. The condenser within the station prevents trouble in the event of a cross between a hot primary wire and the series circuit while the testing device is in operation. Not only would such a cross occasion no hazard, but it would not interfere with the test nor cause any delay whatever. (See Fig. 4.)

The portable condenser is made of tin foil insulated with varnished cambric and equipped with a skinning knife. The weight is just 6 lb. A bridle snap is provided for attachment to the lineman's belt and there is a shield to protect the knife when not in use.

The condenser for station testing is made similarly to the portable unit except that no waterproofing or skinning knife is needed. (See Fig. 2.) The insulation condenser between the series circuit and the signal-producing device may be made the same way as the other two and provided with suitable terminals. None of the above equipment is expensive or difficult to construct.

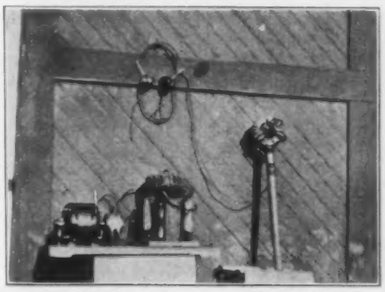


Fig. 6. Experimental 550-volt signal-producing equipment: reactance coil, motor-driven interrupter, testing transformer on handle, and ear phones. Buzzer signals may be picked up with this listening equipment.

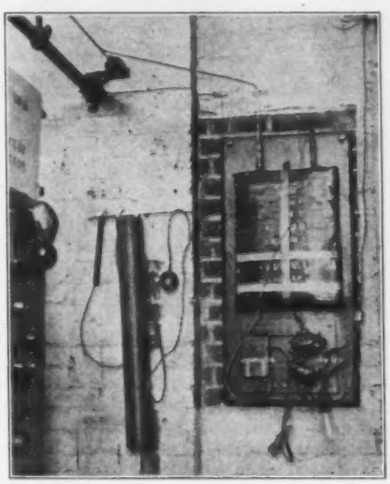


Fig. 7. Station-type equipment out of service.

Ground Tester

The device for locating grounds consists of an arrangement similar to a portable testing current transformer. This is placed over a grounded series circuit wire through which the signal current from the above described device is flowing. Ear phones are connected to the winding of the portable transformer and the signal is heard when the transformer is placed between the station and the grounded point. No signal is heard after the grounded point has been passed.

The strength of the signal is very much increased if the magnetic circuit of the testing transformer is closed. However, the apparatus as shown at the right in Fig. 6 gave a clearly audible signal, though not a loud one, even when the current traversed the entire length of a 16-mile series circuit.

As grounds seldom occur and cause but little difficulty at the particular location where this apparatus was developed, no great effort was made to perfect this piece of apparatus beyond establishing the fact that it would give a positive test.

This apparatus has been in use for about a year in an entirely satisfactory manner and has proved to be more readily understandable to the average workman than is the magneto.

Circuits and methods of test are shown in Figs. 4 and 5.

Other methods of providing a signalling current were tried and one of the best was a 550-volt alternating current interrupted by a contact maker driven by a small induction motor. This gave a very distinct beat due to the slip of the motor and produced a much stronger signal than the induction coil. It was considerably more bulky and more expensive than the coil, however, and consequently was not used as the signal given by the coil was ample. (See Figs. 5 and 6.)

Analysis of Current Transformer Tests—II

Two Current Transformers on a 3-Phase Circuit

By E. C. Goodale, Puget Sound Power & Light Company, Tacoma, Wash.

One of the most common connections in metering and relaying is the one in which two current transformers are used, one in each of two of the wires of a 2-phase or 3-phase 3-wire system. Such a connection is shown in the circuit diagram of Fig. 10, the relays and meters being omitted for simplicity. The asterisks (*) denote the polarity markings of the transformers.

Assuming the load to be balanced the line currents I_A, I_B and I_C will be 120 electrical degrees or ⅓-cycle apart as to time or phase relation. If the current transformer ratio be R then

$$I_a = \frac{I_A}{R}$$

Fig. 10 (vector diagram) shows this graphically.

The current I_d in the tap line d e may be determined by applying a modification of Kirchoff's Law: the sum of the currents leaving a junction point is equal to the sum of the currents entering the junction point. Thus at point d, $I_d = I_a + I_b$. These additions of course are vectorial and made as described in Part I (Electrical West, March, 1927, p. 149.)

These results are subject to prediction by the use of the law and also are obtained under actual test conditions. A 3-phase balanced load consisting of

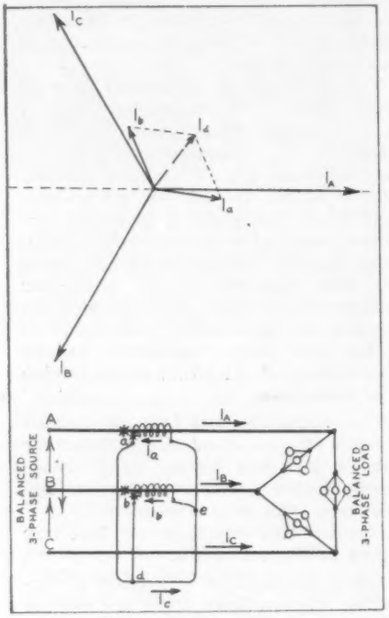


Fig. 10. Common installation of two current transformers on a 2 or 3-phase circuit.

three 250-watt lamps in parallel across each phase of the line was used to draw current from a 3-phase 3-wire line. The values and phase relations of the various voltages and currents were obtained by the use of a voltmeter, an ammeter, a wattmeter, a variable autotransformer and an inductance coil.

Phasing

In phasing a current it is passed through the current coil of the wattmeter the potential coil of which is energized from a reference voltage. This same reference voltage, the phase position of which is assumed horizontal and to the right at zero degrees in the diagram, is used in phasing out all currents.

In phasing a voltage it is applied to the wattmeter's potential coil while the current coil is energized from a reference current. This latter current is in phase with the reference voltage and is obtained by supplying a pure resistance load from the reference voltage, feeding this load current through the ammeter and current coil of the wattmeter. The voltmeter is in parallel with the wattmeter potential coil and the ammeter is in series with the wattmeter current coil.

Whether phasing a current or a voltage the wattmeter readings (watts) divided by the product of voltmeter times ammeter readings (volt-amperes) gives the cosine of the angle by which the current (or voltage) either lags or leads the reference voltage (or current) respectively. From a trigonometric table this angle may be found opposite its cosine. If the cosine is negative then the angle is 180 deg. minus what it would be if the cosine were positive.

For example: Suppose that in phasing a current the voltmeter reads 100, the ammeter 5, and the wattmeter —433.

Then

$$\frac{-433}{100 \times 5} = 0.866.$$

This value is the cosine of the angle by which the current lags or leads the reference voltage. From a trigonometric table it is found that 0.866 is the cosine of 30 deg. Therefore, —.866 is the cosine of (180—30) deg. or 150 deg., which is the desired angle.

If it were known whether this 150 deg. were lead or lag the autotransformer and inductance coil would be unnecessary. The inductance coil is used to cause the reference voltage to lag its normal phase position, but also decreases it due to losses within the coil. The autotransformer is used to boost the reference voltage back to its original value but does not affect its phase position. Fig. 11 shows the circuit diagram and also a complete vector diagram indicating the correct phase relations of all currents and voltages.

The autotransformer should be adjusted until the voltmeter reads the same with the double-throw switch either up or down. See Fig. 11. In phasing a current the lagging (switch up) of the reference voltage causes the wattmeter to indicate a smaller positive or greater negative reading than normal

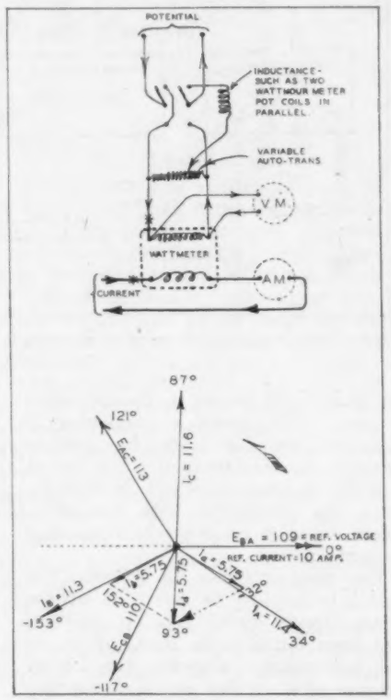


Fig. 11. Connection diagram for phasing test, and resulting vector diagram.

(switch down), if the current be leading. In the same way the lagging of the reference voltage will cause a greater positive or smaler negative wattmeter reading than normal, if the current be lagging the reference voltage. The only exception to this rule occurs when the current is lagging by but a very few degrees (one-half the amount the voltage has been lagged by the inductance coil) or leading by nearly 180 deg. In those positions the action explained above will be the reverse, but the change in wattmeter readings will be very slight for the change in position of the double-throw switch.

In phasing a voltage the lagging (switch up) of the voltage causes the wattmeter to indicate a greater positive

Table I—Test Data

	Volts or Amp.	Watts—Switch Down	Cosine of Angle	Angle (Deg.)	Regis.—Switch Up	Lead (Pos.) or Lag (Neg.)
E_{BA}	109.0	+1,090	+1.00	0	Decreased Pos.	In Phase
E_{CB}	110.0	— 505	—0.46	117	Increased Neg.	Lag
E_{AC}	113.0	— 590	—0.52	121	Decreased Neg.	Lead
I_A	11.4	+1.040	+0.83	34	Increased Pos.	Lag
I_B	11.3	—1,100	—0.89	153	Decreased Neg.	Lag
I_C	11.6	+ 60	+0.05	87	Slight Neg.	Lead
I_a	5.75	+ 530	+0.85	32	Increased Pos.	Lag
I_b	5.75	— 550	—0.88	152	Decreased Neg.	Lag
I_c	5.75	— 30	—0.05	93	Slight Neg.	Lag

or a smaller negative reading than normal (switch down), if the voltage be leading; or a smaller positive or greater negative reading, if the voltage be lagging the reference current. The only exception occurs when the current is leading by a very few degrees or lagging by nearly 180 deg. In these latter positions the action will be the reverse of that explained above, but the change in wattmeter readings will be very slight for the change in position of the double-throw switch.

Actual Test Results

The accompanying table shows results of test. See Fig. 10 for connection diagram.

The current transformer ratios were 10/5. The reference voltage was E_{AB} which was 109 volts. The reference current was a 10-amp. current drawn by

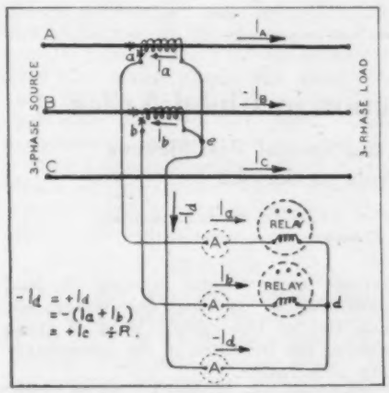


Fig. 12. Common application of two current transformers on 3-phase circuit. The negative signs indicate currents flowing opposite to an assumed normal direction which is designated as positive.

a pure resistance load energized from E_{AB}. See Fig. 11 for the vector and circuit diagrams of these test results.

From the tests it is seen that Kirchoff's current law is borne out quite accurately, this diagram comparing closely with the ideal diagram, Fig. 10. Tests for unbalanced loads were made with one 250-watt lamp across AB phase, two across BC chase, and three across CA phase. Line currents then were: $I_A = 8.10$ amp. at 47-deg. lag. $I_B = 6.05$ amp. at 142-deg. lag, and $I_C = 10.00$ amp. at 94-deg. lead. Secondary currents were: $I_a = 4.05$ amp. at 47-deg. lag, and $I_c = 3.05$ amp. at 142-deg. lag Tap current I_d was 5.00 amp. at 87-deg. lag. This latter current, I_c, is vector ially equal to $I_a + I_b$, or equal to $-\frac{1}{2} I_c$.

A frequently used application of this type of current-transformer connection is in the protection of a 3-phase, 3-wire line by overload relays. Another is in connecting switchboard ammeters for reading the currents in all three lines. Connections for these applications are shown in Fig. 12.

EDITOR'S NOTE: This is the second of a series of articles prepared by Mr. Goodale and built around actual laboratory tests of various instrument transformer connections as made in the laboratory of the Syracuse Lighting Company, Syracuse, N. Y.

Turbine Break Causes Power House Deluge

By H. E. BAKER, District Manager, Pacific Power & Light Company, Hood River, Ore.

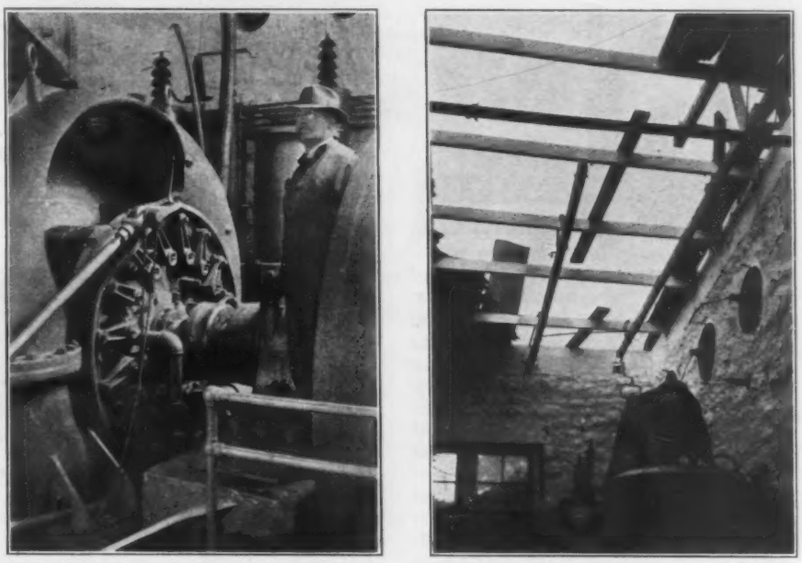
An unusual accident occurred on November 22, 1926, at the Tygh Valley hydroelectric plant of the Pacific Power & Light Company. A turbine casing failed and the water thus released tore a hole in the roof of the building, drenching the switches, transformers and other contents of the building. Also the column of water that went through the roof struck the hill above the plant and washed a large quantity of mud and debris down into the plant.

This wheel that was damaged is a 32-in. Pelton-Francis turbine rated at 2,100 hp. and operating at 143-ft. head. It has been in service since 1912. In connection with it is an automatic relief valve capabale of by-passing and discharging 30 per cent of the flow of the 4-ft. penstock of the unit. The relief valve usually opens quickly when the governor closes the water-wheel gates and closes slowly when these gates are re-opened. The two other generating units are rated at 500 kw.

Shortly before the accident a short circuit on the transmission line had opened the oil switches at the plant. The trouble was located between The Dalles and Powerdale, hence the line was opened at The Dalles substation and the large unit at White River was started up to carry the load on its end of the system and had begun to pick up load. The relief valve had opened on the former disturbance and had begun to close, but had not completed the operation. The machine had picked up about 1,000 kw. when a second disturbance occurred causing the generator switch to relay open. The governor operated to close the wheel gates, but operated somewhat more rapidly than usual. Almost immediately a section of the 1⅛-in. cast iron scroll case of the turbine broke out leaving a hole 5 ft. long and 2 ft. wide. A subsequent examination revealed no visible flaws or defects.

The resulting spout of water from the hole in the casing had sufficient force to tear a hole 18 x 24 ft. in the roof of the building, which roof is of asphaltum cement laid on corrugated iron. Striking the hill some 50 ft. above the plant it washed dirt, rocks and debris down through double doors on the hill side of the plant so that the entire floor of the generator room was covered to a depth of from 1½ ft. to 4½ ft. All equipment in the plant including generators, exciters, lightning arresters, switches, transformers, switchboard and meters was thoroughly soaked. Switch and transformer cases were filled with water and sand and sand likewise was washed into the bearings and windings of all the machines. Every piece of equipment in the plant had to be taken apart, dried out and cleaned. Luckily no person was hurt. Two operators in the plant at the time escaped with no more serious experience than a good scare and wetting.

In restoring service The Dalles and Dufur substations were fed from the Powerdale end as soon as the transmission line was repaired. The small settlement at Tygh Valley fed at 2.3-kv. directly from the plant was served after three days when one of the smaller machines in the plant was put back into service. About a month was required to dry out and clean the other machines, the step-up transformers, oil circuit breakers and all other miscellaneous electrical equipment so that the plant again could function as an integral part of the system.



At the left is shown the 5-ft. break in a 2,100-hp. turbine casing and at the right is shown the hole torn in the roof by the released water.

Pole Stubbing Facilitated by Use of Strap Clamp

By R. E. CUNNINGHAM, Farnham & Cunningham, Los Angeles

Pole stubbing always has been more or less of a problem to pole-using utilities. In spite of aversion to stubbing poles as a general practice, particularly in urban districts, the fact remains that under certain conditions there is much economy in stubbing poles in rural districts or where the cost of transferring overhead construction to a new pole is a considerable item. Of the many different methods of stubbing the most common is that using a short wooden stub set alongside of and fastened to the pole.

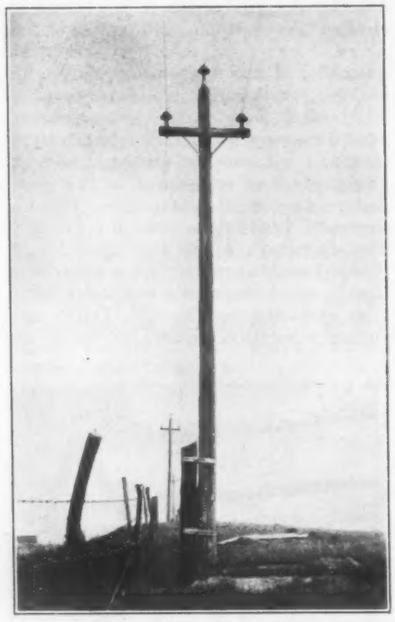


Fig. 1. Details of new stubbing clamp.

There are certain matters which should be given consideration in the use of wooden stubs if best results are to be obtained. An untreated wooden stub does not last long when put into the ground next to a termite-infested or rotten pole as the termites and fungus in the old pole and in the surrounding earth immediately attack the stub. Under such conditions the best practice is to use a treated stub, preferably of the pressure method of treatment. With the assurance of a long-lived stub proper methods of attachment should be used. The old method of wrapping with wire to fasten a stub to an old pole required considerable labor and the material was of little or no salvage value when the pole had finished the rest of its life.

A new device known as the Samson stubbing clamp has gained favor where tried and seems to have overcome many of the difficulties incident to usual methods and equipment. Details of this new clamp may be gathered from Fig. 1 which illustrates also the method of attachment. It may be noted that the device consists of a saddle and an adjustable clamping strap. The saddle is placed between the stub and the pole and is fastened in place with lag screws. These saddles serve to keep the stub and pole in fixed, definite alignment. After the saddles are in place the strap is fastened around the pole and stub and drawn up tight by the transverse through-bolt. It may be noted further that it is unnecessary to bore any holes through the pole or stub in order to attach the clamp.

Two sizes of clamp are in use; a size adapted to poles from 7 to 13 in. in diameter and a larger size accommodating pole diameters up to 18 in. In Fig. 2 is shown a case where the pole is entirely rotted away at the ground line and is supported in the clear by the stub and clamps. Even in this situation alignment is maintained. The labor cost saved in attaching these clamps as compared to the cost of the old method of wrapping with wire and boring holes through the pole and stub practically pays for the device. If a properly treated stub is used both the stub and the clamp can be salvaged at practically 100 per cent of their original value and re-used on other jobs.

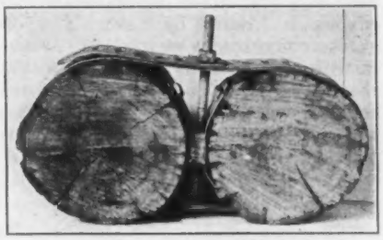


Fig. 2. Pole carrying three 13.2-kv. No. O conductors supported clear of ground by stubbing clamps.

Underground Construction in Flood Areas

Float-Switch Signal System and Special Test Sleeves Prove Valuable Aids to Service

By CLAYTON BIGGS, Superintendent of Underground Construction, Southern California Edison Company, Los Angeles

Two difficulties commonly faced in underground transformer vaults are the influx of water during storm conditions and the difficulty in making transformer tests that necessitate cutting or puncturing the lead cable sheath. The underground department of the Southern California Edison Company has developed an automatic float switch to indicate the presence of water and also a removable sleeve permitting access to the conductor in lead-covered transformer leads without injuring the lead sheathing or spoiling the waterproof qualities of the cable. Both of these devices are indicated in the accompanying illustration.

The home-made device used to facilitate the making of load tests on transformers appears at the left in the illustration on two of the transformer leads. This device consists simply of an 8-in. bakelite tube which is threaded on both ends, two brass nipples which also are

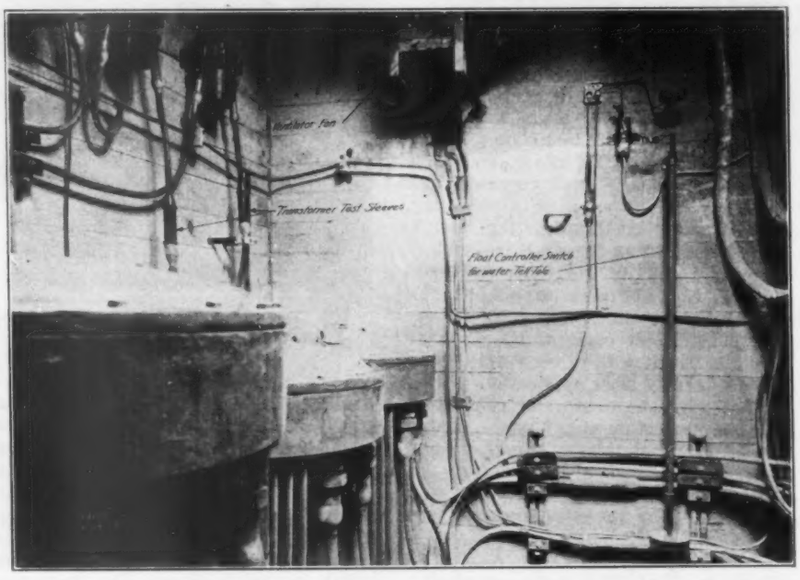


Fig. 1. Commercial distribution vault in one of the Southern California Edison Company's beach districts. At the left on two of the transformer leads may be noted the removable test sleeves. At the right may be noted the rigid-float type of switch used to send a signal impulse to the substation when water reaches a depth of 12 in. in the vault.

threaded and two cone-shaped rubber gaskets. Prior to the installation of this device a 1-in. cut is made in the sheath of the transformer lead and the insulation is removed and replaced by friction tape. The bakelite tube then is slipped onto the cable and centered over the cut in the lead sheath where the friction tape has replaced the normal cable insulation. The lower waterproofing rubber gasket is slipped up into place at the lower end of the bakelite tube and one of the brass nipples then is screwed up tightly onto the lower end of the threaded tube, thus forming a tight joint. This lower nipple is wiped directly onto the lead sheath of the cable. Closure of the upper end of the bakelite tube is effected in the same manner with a rubber gasket and brass nipple with the exception of the fact that the upper nipple is not wiped to the cable.

To make a test on a transformer, then, it is necessary only to unscrew the unwiped nipple at the upper end of the bakelite tube, unscrew the bakelite tube from the lower nipple and slide the part up far enough to uncover the previously prepared test point. This arrangement permits tests to be made without necessitating the cutting of the sheath of live cables. The assembly described has proved satisfactory and entirely waterproof.

Water Alarm

The water indicator consists simply of a float contactor switch as shown at the right in the accompanying illustration. This float arrangement is so designed that contacts will be closed when water reaches a depth of 12 in. in the manhole or vault. These water indicators have proved to be very valuable in important locations where there is any chance at all of an influx of water. In one of the beach districts an indicator is installed in each vault in a relatively large area that is more or less subject to flooding. Signal wires connect the contactor on the float switch in each of the transformer vaults to corresponding signal annunciators in the substation serving the area involved.

This area is divided into sections, each section having from three to five vaults. A 3-pair No. 19 gage rubber-and-lead-covered 250-volt signal cable is used. Two of these three pairs of conductors are used to carry the water level signals from the vaults to corresponding indicators in the substation. Each pair is connected to a group of two or three vaults the location of which permit their logical combination on a single signal circuit. The signal circuits operate on 110 volts to a common neutral. Thus the lighting of one of the signal lamps in the substation indicates at least 12 in. of water in one of the two or three vaults connected to that particular signal circuit. A corresponding map or location chart indicates the exact position of the vault or vaults in trouble. Through this system the substation operator is rather intimately in touch with all vaults subject to water conditions and can institute relief measures in time to prevent any serious damage.

An additional feature has been included in the aforementioned beach area where the most intensive installation of water alarms has been made. This additional feature is the installation of a telephone connection from the substation to each of the vaults and to each of the manholes involved in the area mentioned. One of the three pairs in the signal cable is reserved for a telephone communication circuit. This system permits practically instant communication between a repair crew in any of the vaults and the substation itself.

The expense of these protective features has been slight indeed as compared with the value of the protection service rendered.

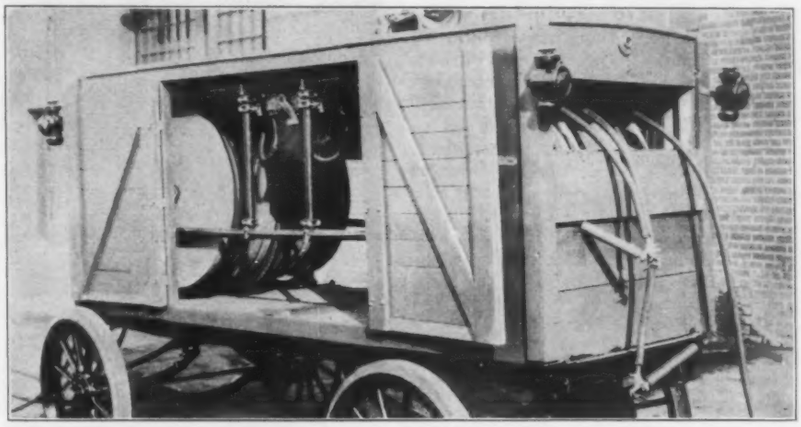
Emergency Reel Cart Facilitates Service Restoration

By A. KANEKEBERG, Electric Distribution Department, Public Service Company of Colorado, Denver.

Service interruptions due to broken line conductors have been greatly shortened since the acquisition of the emergency reel cart shown in the accompanying illustration. The distribution department of the Public Service Company of Colorado uses this equipment not only for emergency work, but also for service work where it is necessary to bypass lines or equipment temporarily.

The cart contains six reels of cable and a 3-phase oil circuit breaker. Each reel carries 200 ft. of 4/0 extra-flexible 5-kv. Kerite cable and reels are mounted in banks of three on each side of the breaker. This particular size of cable was selected because of its wide range of usefulness. Each cable-end is fitted with a suitable connector, on the switch end a split-type motor lug and on the line end a screw clamp. In the illustration two of the screw clamps may be seen hanging from the end of the cart and it may be noted that they are fitted with insulating handles to facilitate their application on hot lines.

With the cable reels arranged in two banks of three each it is but necessary to run the cart to the desired location between the line ends to be connected and to string the cables each way from there. The circuit breaker is made up of three 2-pole switches with the two poles paralleled, forming three single-pole tanks. The rating is 4.5 kv. To prevent excessive heating in case any large amount of cable is left on the reels while they are in service the reels are mounted upon copper axles. The cart chassis is made of obsolete automobile parts and the whole equipment represents a very small investment for the service rendered.



Emergency service restoration cart built by distribution department of the Public Service Company of Colorado.

Steam Flow Meters Increase Mill Efficiency

That steam flow meters facilitate greater operating economies even in the smaller plants is evidenced by experiences at the mill of the Dolbeer Carson Lumber Company at Eureka, Calif. At that mill six boilers were installed in July, 1924, and six indicating, recording, registering flow meters were installed to insure balanced operation of all boilers. According to the report a close check of these meters has made possible the elimination of steam deficiencies and permitted a smoother operation that has resulted in five boilers carrying the expected load of six.

The meters give the alarm of poor fire conditions before they would be noted otherwise and also warn of increased steam demands due to coincident operation of heavy machines. A record of pounds of steam produced is kept and balanced against the kw-hr. generated and against the output of the mill. A competitive spirit is developed among the firemen to keep the output curves as smooth as possible for each shift.

Ideas for the Contractor

Technique Developed in Use of Steel Underfloor Duct

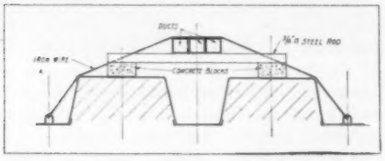
Arc Welder Utilized in Russ Building Installation; New Los Angeles City Hall Job Evolves Fittings for Tapping Into Three-Channel Duct System

ANY new material must have developed for it ways in which it can be used to advantage. When no previous experience or technique is available those who pioneer with the material are thrown upon their own resources and ingenuity to develop a technique which others may follow or improve upon. With the new drawn steel underfloor duct the recent experiences of three electrical contractors, each a little different, have served to bring out the truth of such a statement.

The buildings in question are three of the West's newest sky-scrapers: in San Francisco the Adam Grant Building, now almost completed, and the 30-story Russ Building being rushed to completion; in Los Angeles the new City Hall, a 20-story building in construction and likewise soon to be finished.

Adam Grant Building

In the Adam Grant Building at Bush and Sansome Streets, San Francisco, the underfloor duct was first decided upon by the electrical contractor, H. C. Reid & Company. However, the Johns-Manville Corporation had not then delivered to the Pacific Coast more than a few samples of its steel duct. Not to delay the concrete work H. C. Reid & Company laid sleepers of the required size where the duct was later to go. When the duct arrived the sleepers were withdrawn from the already set concrete and the duct assembled and boxes set.



Method of anchoring duct prior to concrete pour on City Hall job.

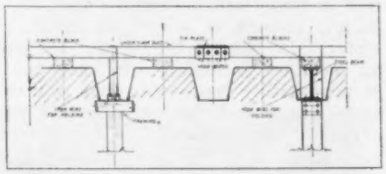
Duct being spot welded electrically to girders on Russ Building.

It was felt that the tendency to unevenness of concrete in its setting and curing would make inadvisable the placing of the duct flush with the surface of the slab, so means were taken to cover the duct. A space along each side of the duct channel was roughed and wire mesh laid over the duct extending over the roughed area. Cement was then grouted around the duct and over both it and the mesh to the floor slab level, making a smooth floor surface.

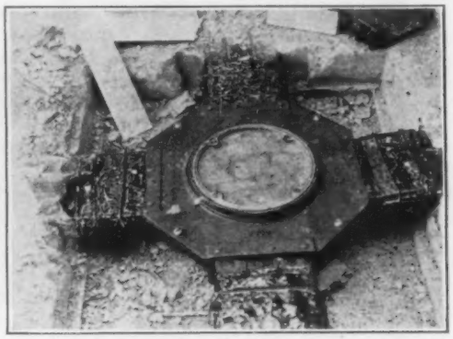
In this manner the irregularities due to the unequal contraction of the concrete and the steel were avoided and the linoleum laid over the finished floor would be uninfluenced by the duct. In the Adam Grant Building the duct was used for the telephone system only, a single channel duct being employed.

Arc Welding Duct to Russ Building Frame.

A very interesting technique for the handling of the duct on the Russ Building in San Francisco was worked out by George Garthorne, of Hunter & Hudson, electrical engineers, and Victor Lemoge, Electragist, the electrical contractor for the building. The Russ Building job, from a construction organization standpoint, has been one of the most advanced in the experience of Western building. The construction has been so well organized that the first floors of the building were being occupied while steel was still going up for the top stories.



Anchoring duct where it traverses pan at right angles.



Left: Junction box opened, showing adjustable ring and ingenious channelways to direct wires or cable into proper section of duct. Center: For conduit runouts the closure plate shown is drilled to conduit size. Right: Box with cover on and joints wired and asphalted ready to be covered—City Hall job.

Arc-welded to the building framework the duct in the Russ Building, San Francisco, formed a rigid and accurate level to which the concrete slab was poured. Center: One of the junction boxes for single duct and the saddle and duct welded to the steel beam. The taped joint may also be seen. Right: Bends made in duct to swing away from elevator shafts.

This type of construction required alert electrical installation management and up-to-date machinery and methods. Victor Lemoge immediately installed a steel cutting band saw with which to cut all duct and conduit to length accurately and speedily and employed the San Francisco Welding Company to arc weld the duct quickly and securely to the building steel framework.

Strap steel saddles were bent to required height for the support of the duct. These saddles were set on the steel beams and the duct and boxes assembled and joints sealed. Then the arc-welder operator passed quickly along a length of duct touching the welding tip to the saddle and duct so as to spot-weld the saddle to the steel beam and the duct to the saddle. The junction boxes were also spot-welded to the duct. The duct thus treated became an integral and rigid part of the building frame itself.

Because the duct presented a convenient level on which to pour the concrete and finish the slab it was used as a screed by the concrete men. It was an easy matter to adjust the duct to exact level by bending the saddles slightly. As finished the duct may be seen as a straight black line running the length of the slab and easily located for future tapping for telephone service.

There were 36,720 ft. of duct, 1½ in. high by 2 or 3 in. installed in the Russ job. There were used 7,140 saddles and 28,560 welds were made to secure the duct and saddles to the building. There were used 621 junction boxes requiring six welds per box, and bringing the total number of welds up to 32,286. The cost of the welding exclusive of power cost, Mr. Lemoge gives as $756.66. The welder was operated on a 60-amp., 220-volt circuit. For the conduit runouts from the junction boxes to the terminal cabinets there were used 8,000 ft. of 1½-in. and 400 ft. of 1-in. conduit. A total of 142 terminal cabinets were installed.

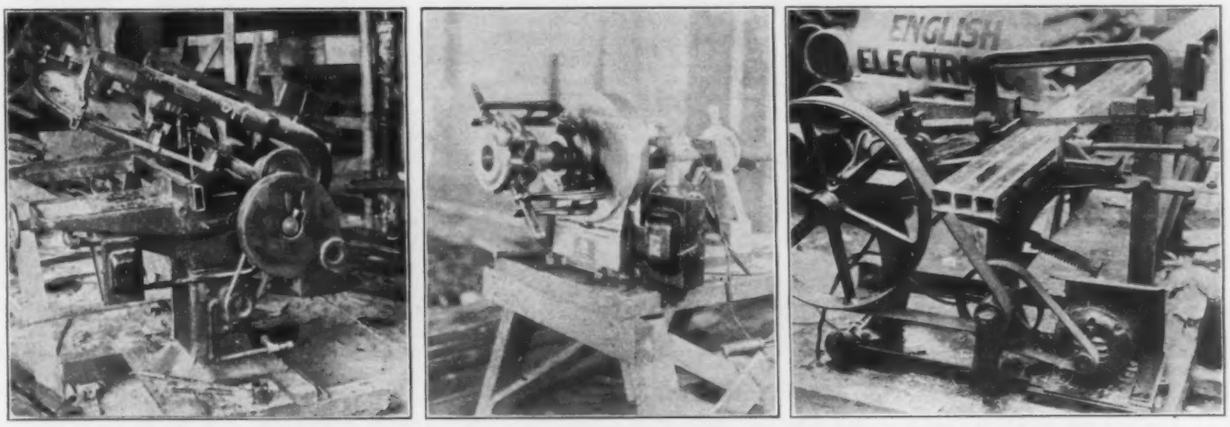
Three views showing duct and conduit laid before pouring of concrete in Los Angeles City Hall.

To cross corridors, the floors of which are to be finished in marble, the duct was made to drop 1 in. by means of "crossunder" duct, bent to take the two angles necessary. To avoid running into elevator shafts and necessitate the use of extra junction boxes, angle bends were made in the duct by Mr. Lemoge. Told that it could not be done he determined to find out for himself. It was found that the duct could be bent cold with the equipment at the U.S. Pipe Bending Company. All joints of duct lengths were sealed with adhesive tape, such as used by physicians, and clamped in the cast iron clamps provided.

During the pouring of the conduit the junction boxes were filled with sawdust and covered with temporary covers. The permanent cover, with a brass ring arrangement which will be flush with the surface of the linoleum floor covering, is to be put in as tenants take quarters in the building. The fittings for tapping into the duct were manufactured in San Francisco on designs made by Mr. Lemoge. These fittings are designed to be inset in the linoleum flush with its surface.

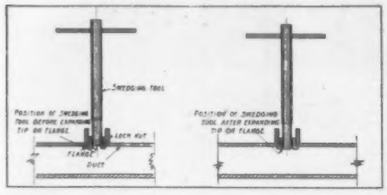
Three-Channel Duct in City Hall Job.

The first use of the three-channel duct on the Pacific Coast is that in the



Up-to-date machinery was employed in handling the materials preparatory to installation. The remarkably fast and accurate steel cutting band saw and the pipe threader (center) used by Victor Lemoge on the Russ Building speeded up the work. The English Electric Company on the City Hall job used the motor hack saw shown at right.

new Los Angeles City Hall, being erected in that city. Holmes and Sanborn, electrical engineers for the job, decided to use the duct for not only



Swedging tool to expand flange on fittings designed to be used to tap into duct. The nipple is then screwed to the special flange-held fitting.

telephones but for intercommunicating telephones and for power for office machines and desk lamps.

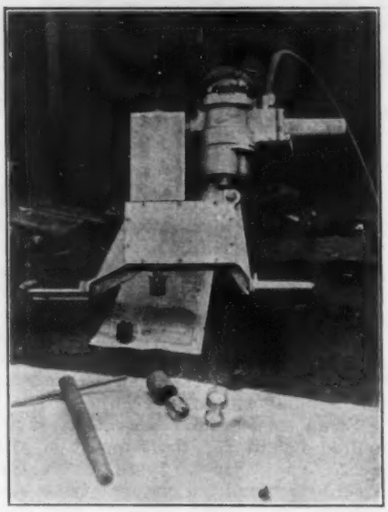
The three-channel duct is made up of three of the 1½ x 1½ in. lengths of duct spot-welded together at 4-ft. intervals. The accompanying illustrations demonstrate how it was laid. Small concrete blocks were used to support the duct over the floor pan and the whole anchored by means of iron wire to the framing. This duct was laid so as to be about half an inch below the floor surface.

Because the junction boxes were not available at the time the first floors were ready to be poured, space was provided for them and the boxes set later in the manner shown. These boxes, because of the three circuits contained in the duct, are ingeniously designed to keep each channel separate. Wire in one duct coming through the box is directed straight through. The other two channels are carried under or over the first in a manner to keep the three circuits entirely separate.

In order to bring the cover of the box to floor and linoleum level an adjustable ring, floating on set screws, is provided to support the cover. A gasket the thickness of the linoleum is used under the cover to bring it to required height. The linoleum thus cut from around the cover is trimmed to be inlaid inside the cover ring, leaving but a thin double ring of brass visible from the floor. A light wire mesh was placed over the box and around the cover to bind the cement over the boxes.

To run conduit to the junction boxes a closure plate was inserted in the duct entranceway. In this closure plate holes were drilled to accommodate the size conduit used. A special connector had to be designed for use instead of the usual conduit bushing since the latter proved too thick.

Likewise for taps into the duct the foreman for the English Electric Company, electrical contractors for the job, J. B. Shamel, and George Dehn, estimator, devised the flanged fitting now being used. A brass coupling, having a rolled flange or bead on its inner surface and threaded only part way, is inserted in a hole drilled into the duct from the floor at the spot where a tap is to be made. A swedging tool is inserted and so forced down that the bead or flange is rolled out in such a manner as to grip the under side of the duct opening and hold fast. A coupling is then screwed to the projecting end of this fitting to connect with floor plug or other outlet as required.



Tools used for making taps into duct: the electric drill with special cutter to pierce concrete-finish slab and steel duct: the swedging tool and fittings and nipples.

Letters Prove Quality Installations Are Appreciated

From time to time editorial comment has been made in these columns to the effect that quality workmanship brings greater rewards than price alone. It has been contended that an electrical contractor may so conduct his business that he will be given work regardless of price consideration if he establishes himself upon a high plane and does not cut below that high standard even for price.

Testimony of the success of such a procedure came to light recently when a group of letters sent to one contractor in Los Angeles were displayed modestly to a member of the staff of Electrical West. Permission to reprint some of these letters was finally obtained from Paul Ehm, president of the Golden State Electric Company of Los Angeles. The letters tell their own story more eloquently than any further explanation can do it for them:

W. J. DODD, Architect
WILLIAM RICHARDS, Engineer
905 Brack Shops Building
Los Angeles, Calif., Oct. 2, 1920.

Golden State Electric Company,
748 West Seventh Street,
Los Angeles, Calif.

Gentlemen: In response to your request, it gives us great pleasure to testify to your ability and work as demonstrated throughout a number of contracts you have executed from this office. You have carried through for us jobs varying from small Class "C" buildings to important Class "A" structures with uniform satisfaction to us and the owners. We have had experience with your work both under fixed contract and on force accounts and have found in both classes that you have not only lived up to specifications but have been uniformly liberal in their interpretation. Your methods of work are the very best known to the craft. You have never, to our knowledge, attempted substitution of any kind whatsoever, and your work has always been done by skilled labor and has had the best possible supervision by yourselves.

We also wish to subscribe to the fact that you have never yet delayed work on a job either by delay on your own contract time or by holding up other contractors. We would also like to draw attention to the fact that on the work you are now doing on two Class "A" structures on a fixed fee-plus-cost basis the actual cost of the work is practically identical with your estimates.

We have not the slightest hesitation in recommending you, without reserve of any kind whatsoever, for any class of electrical work, no matter how important.

Very truly yours,
DODD & RICHARDS,
By WILLIAM RICHARDS.

Cheesecloth or Velvet?

The public, YOUR public, doesn't expect velvet at the price of cheesecloth.

Unfortunately, the public has formed the habit (through no fault of its own) of demanding "electrical cheesecloth" in large quantities.

As far as YOUR public is concerned, it is your job, your responsibility, and to your advantage to SHOW your public that "electrical cheesecloth" at ANY price is a poor value, a bad investment; and that YOU have high class "electrical velvet" for sale at all times in the form of the service you are offering.

You will sell a good deal of "electrical velvet" if all the people who are wanting real electrical service KNOW ITS VALUE and KNOW THAT YOU CARRY IT.

But even a gold mine must be developed.

A professional salesman is aware of the "low market price" (or any price) only as a matter of fact, NOT as a leaning-post.

He realizes that his job is SELLING, NOT buying, begging nor bootlegging.

He assumes that the price-mark on the goods is correct and devotes his full energy and ability to SELLING the goods on that basis.

[From the Bulletin of the California Electragists, Southern Division.]

SCOFIELD ENGINEERING CONSTRUCTION COMPANY
Wright & Callender Bldg.
405 South Hill Street
Los Angeles, Calif., Sept. 21, 1920.

Golden State Electric Company,
748 West Seventh Street,
Los Angeles, Calif.

Gentlemen: We are just in receipt of your letter of Sept. 18, expressing a desire to cooperate with us to the fullest extent in expediting the work in the two buildings which you have under contract with us at the present time, and inquiring as to whether or not your work is meeting our expectations as to quality and progress.

This inquiry of yours gives us the opportunity which we have looked for to express to you the satisfaction which we do feel with your work. Of all the subcontractors which we have to deal with, we are perfectly sincere in saying that none of them has kept his work up to date nor caused so little inconvenience to ourselves and other subcontractors as your company. Your efficiency in handling the work, and the quality of the work when completed has been such that it has drawn favorable criticism a great many times from various parts of our organization. If at any time it should develop that we can be of any assistance to you, or say a good word for you in any quarter, please do not hesitate to call upon us.

As far as your request for suggestions is

concerned the writer only asks that you maintain the present well established standard of progress and quality of workmanship, and you will never need to worry over what contractors will say about you.

Very truly yours,
SCOFIELD ENGINEERING CONSTRUCTION COMPANY.
F. J. TWAITS,
Vice-President.

B. MARCUS PRITECA, A.R.C.A.
ARCHITECT
507-9-11 Pantages Building

Seattle, Wash., Oct. 5, 1920.

Golden State Electric Company,
Electrical Contractors,
748 West Seventh Street,
Los Angeles, Calif.

Gentlemen: Now that your contract on the above building is complete, I beg to take this opportunity of thanking you for the excellent manner in which you executed the terms of your contract, and it is a privilege for me to be able to say to you, sincerely, that your work was all that could be desired by any architect.

Not forgetting the fact that my plans and specifications called for an installation of a higher type than is usually installed in the average building, your close attention to the various details was only equalled by the high standard of your craftsmanship and efficiency, and I expecially wish to commend the excellent co-operation of your department heads, whose unceasing vigilance and application were without equal on any of my buildings.

As you are well aware, my operations take me to various parts of the country, and in contrasting the work of other contractors in your line I want to tell you that I shall look forward with pleasure to an early chance of our being associated on the same job together.

With best wishes for the success of your organization, I remain,

Yours faithfully,
B. MARCUS PRITECA.

And in a second letter the same writer took a second occasion to express himself pleased, as follows:

B. MARCUS PRITECA, A.R.C.A.
ARCHITECT
507-9-11 Pantages Building

Seattle, Wash., Oct. 5, 1920.

Golden State Electric Company,
Electrical Contractors,
748 West Seventh Street,
Los Angeles, Calif.

Gentlemen: Enclosed please find the letter of commendation for the excellent work which you performed on the above building, and which I hope will be of benefit to you in your efforts to secure other work; and I want to say that this is written with all sincerity on my part, for it is a pleasure to run across a contracting organization that furnishes such wonderful service and co-operation as yours did. I assure you it is a pleasure to work with such people, for only under extraordinary circumstances can one appreciate the higher efforts of his craftsmen. I have no doubt that you will be able to land the work from Architect Bergstrom's office. Call on me at any time, for anything I can do in your behalf, even to making a trip to California if that should be found necessary.

With best regards to you all, and hoping to see you soon, I remain,

Yours faithfully,
B. MARCUS PRITECA.

Greely Track Installs Lighting For Night Racing

Moonlight, ably and efficiently assisted by electric illumination, has made possible night horse racing with excellent results at the Weld County fair race track at Greeley, Colo.

Sixty Westinghouse standard series street hood bodies and vapor proof angle reflectors have been installed and are supplied by the Home Gas & Electric Company of Greeley.

The heads and the angle reflectors were suspended about 30 ft. high and approximately 45 ft. apart, and so arranged that the light was directed out from the inside rail at all points except directly in front of the grandstand, where all units were mounted directly in front of the stand so that there would be no glare in the eyes of the spectators.

The light was reported so well controlled by the angle reflector that the track stood out brilliantly against the darkness of the night. There was very little spill from the reflector, and the fences and the track stood out sharply, with the result that no trouble was experienced in getting the horses to race naturally, with no fear or shying.

The night horseracing at this fair was part of a regularly scheduled program.

Floodlighting in Denver

Eight 500-watt projectors illuminate the Thatcher monument in City Park, Denver, Colo. Photograph courtesy Denver Post.

Carbon Lamp as Emergency Compass.—Polarity of filed poles of a motor may be determined in emergency by using a carbon lamp. When a 32-c.p. lamp is held in front of the pole of a motor the filiment will deflect.

Code and Safety Orders

Questions and Answers

Arrangements have been made with Claude W. Mitchell, electrical engineer of the Board of Fire Underwriters of the Pacific, to answer through the columns of Electrical West such questions on the National Electrical Code as are of general interest.

Similar arrangements have been made with George E. Kimball, electrical engineer of the Industrial Accident Commission of the State of California, to answer questions on the Electrical Safety Orders issued by the Commission.

While it is the object of this department to assist in a better understanding of the Code and the Safety Orders, replies given are not to be considered as official interpretations applying in all instances, as some of the rules permit of varying interpretations under different conditions. The questioner should be guided by the inspection department having jurisdiction.

Q. Does the State Code contain a section covering installation of NEON signs? If so, please give number of section.

A. You will find the general requirements for high-potential vacuum tube signs under Electrical Safety Order 716-4(d).

Q. What switch and safety devices are required in installations of oil burners in residences used in connection with furnaces? Are no-voltage releases necessary in such installations?

A. Enclosed type switches with low-voltage protection are required by Electrical Safety Order 711-14(a) which reads in part as follows: "The unexpected restarting of a motor driving the oil pump and atomizer for an oil burner might result in flooding the furnace room with oil, with the consequent danger of fire." The Department of Safety of the Industrial Accident Commission does not hold jurisdiction over electrical work in residences, but the above requirement is enforced in places of employment.

Electrically illuminated race track at Weld County Fair, Greeley, Colo.

Many speculative builders in Vancouver, B.C., are realizing the value of Red Seal wiring. At left is an example of a modest home on which Red Seal has been given. Below may be seen a moderately priced six-room house in Vancouver which has obtained a Red Seal certificate. There are now 150 Red Seal homes in that city with an average cost of $8,000 each.

Launching the Red Seal Plan in British Columbia

In Only Eight Months the Electrical Service League Sold One Hundred and Fifty Homes Red Seal and Plan Five Hundred More This Year

AFTER eight months' work by the Electrical Service League of British Columbia, Vancouver, with a population of 250,000 on Dec. 31, 1926, had 150 Red Seal homes to its credit. The quota set by the league for that city during 1927 is 500 additional Red Seal homes.

The inception of the Red Seal movement in Vancouver took place about two years ago when the Electrical Service League decided to concentrate all its residence activities in this campaign. It had previously conducted propaganda towards the improvement of wiring and the installation of more convenience outlets. Considerable delay was met with in obtaining Red Seal licenses in Canada, but the campaign was started on April 15, 1926. The first application was received within two weeks and the months of June, July and August were particularly heavy. Altogether some 2,500 houses of all classes were erected in Vancouver during 1926. Many of these were three or four-room homes and so far the Red Seal plan has been able to touch only the better class of house.

The 150 Red Seal houses erected as a result of the campaign represent a total cost of $1,252,800. These houses contain 10,158 outlets and the total cost of wiring was $31,795.

A comparison between Red Seal and non-Red Seal homes of equal size shows 39 per cent more wiring cost in the Red Seal homes than in the others.

Non-Red Seal Homes

Thirty houses—191 rooms.		Av.
Light outlets	724	24
Convenience outlets	247	8
Switches	539	18
	1,510	50

Red Seal Homes

Thirty houses—191 rooms.		Av.
Light outlets	1,008	33.5
Convenience outlets	468	15.5
Switches	609	20
	2,085	69

The campaign was started by the issuing of circulars from the league office to all building contractors, electrical contractors, rental and trust companies, members of the Real Estate and Property Owners Exchange and architects. Three circulars in all were sent pointing out advantages of the Red Seal standard. The league office then scrutinized all building permits issued. Three mailing pieces were sent to such permit takers. First a booklet entitled "Modernizing the Home," was sent to all home builders. One week later a Red Seal booklet was sent to permit takers in cases of houses that were plainly eligible. The mass of material sent to such permit takers was found to bring good results within a week after its receipt.

Advantages of Personal Contact

Probably the success of the Red Seal campaign in Vancouver was due largely to personal contact. The secretary-manager of the league, J. Hart, in dozens of cases was able to induce builders to put in additional convenience outlets and thus bring the house up to Red Seal standard. The omission of one or two essential items was often discovered when Mr. Hart or his assistant was making the final inspection for the purpose of awarding the seal. In most cases the contractor was glad to have these omissions pointed out to him. This contact had the additional effect of selling the contractor on the Red Seal plan so that today there are twelve speculative contractors who are putting up only Red Seal homes. There are twenty electrical contractors who have

pledged themselves to put in Red Seal wiring wherever it is within their power. The league has induced every electrical contractor putting in a Red Seal job to notify it so that it can be registered and a certificate granted. Further, the civic and municipal departments in and around Vancouver report to the league any house that comes near Red Seal standard. This not only relieves the league of a great deal of work but provides the secretary-manager with numerous prospects which can be worked into genuine Red Seal houses. The league has also issued general invitations to the public to bring in their plans for marking.

The specifications on each Red Seal certificate are on a par, if not above, those in use in many other cities. They are more stringent than the specifications used by Toronto the original Red Seal city. While these specifications are elastic as to the size and layout of houses, the following is the working basis:

Front veranda: 1 ceiling unit, with one switch.
Hall: 1 ceiling unit and switch, with one base-plug for use of vacuum cleaner or for a standard lamp where the area is over 100 sq.ft.
Dining room: 1 ceiling unit, 2 brackets, 1 base-plug, with one 3-way switch.
Living room: 1 ceiling unit, 4 brackets, 2 base-plugs, with one 3-way switch.
Kitchen: 1 ceiling unit, 1 3-way switch, 1 iron outlet.
Alcove: 1 ceiling unit, 1 wall plug for toaster, percolator, etc.
Bath room: 1 ceiling or bracket outlet.
Clothes closets: Clothes closets of 18 sq.ft. or over, 1 ceiling or bracket outlet.
Basement: 1 ceiling outlet over laundry tubs, 1 switch and 1 wall outlet for use of washing machine, etc. The balance usually consists of three ceiling lights covering the coal bin, work bench, etc.
Back porch: 1 ceiling outlet and 1 switch.

If there is a garage attached to the house the league recommends one ceiling outlet with switch and one wall outlet for use of light under the car or for doing small repair work.

Co-operation of the Architects

One of the most successful parts of the campaign has been the obtaining of the co-operation of the architects. The Architects' Institute has had a committee go over the Red Seal specifications and this committee has recommended to the full board their adoption as standard. This institute also has a "Small Home Service Bureau" which has published a booklet and is co-operating with a Vancouver newspaper in a special page each week. The architects have undertaken that when a house is sold from the book the plans are to be sent to the league to be marked for Red Seal wiring. Further, the plans appearing in the newspaper referred to will all contain Red Seal wiring and Red Seal specifications will be printed.

The cost of the campaign for the eight months of 1926 in which it was conducted, was approximately $1,300 including no charge for salaries or overhead. Most of this cost has been in circulars, booklets, signs on buildings, certificates, stickers on panel bases and so forth. The British Columbia Electric Railway Co., the leading member of the league, has contributed some publicity in its own mediums and thus the campaign has been kept before the public.

Of the beneficial results of the campaign there appears to be not the slightest doubt. It is hardly possible to go into a new house, other than a three or four-room shack, and find it without convenience outlets of some kind. Between five and six hundred houses are listed with the Electric Service League, exclusive of the one hundred and fifty Red Seal homes. Of the former, 150 are within 30 per cent and 300 within 50 per cent of the Red Seal standard. Altogether these non-Red Seal houses average about 40 per cent of Red Seal standard. A further effect is to be noticed in the fixture business which has increased materially in the last year. New homes now have fixtures in about 50 per cent of their rooms, whereas formerly no rooms had fixtures except the living room and the dining room.

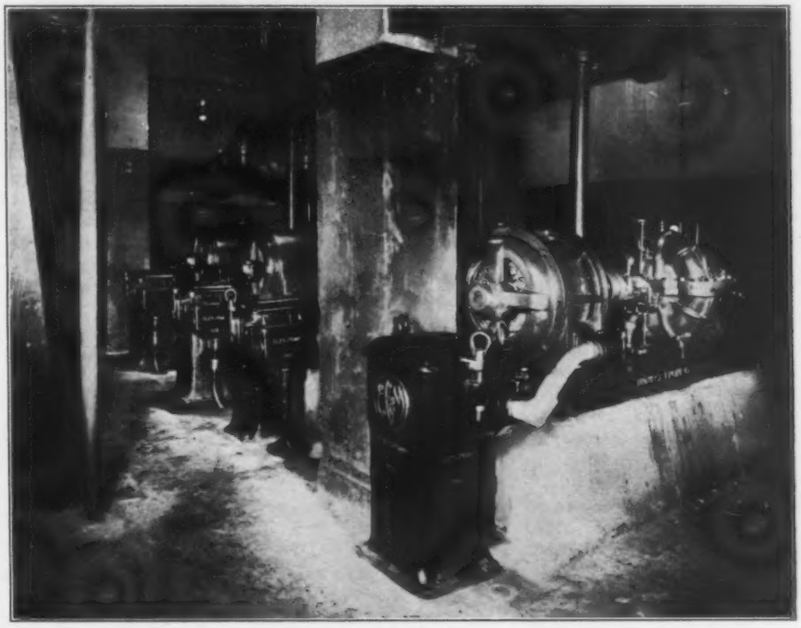
Co-operation of the architects of British Columbia in the Red Seal idea distinguishes this program and assures its success.

The specification of electric range wiring keeps down the number of Red Seal certificates granted.

The league realizes that there are a great many building contractors and prospective owners who still have to be sold on the Red Seal idea, but the trend of equipment in the modern home in the form of electric appliances and portable lamps indicates that it will not be long before every home owner will find a complete installation of convenience outlets essential.

Code Committee Report.—Proposed changes in the National Electrical Code to be considered by the Electrical Committee in its meeting in February were sent out by the California Association of Electrical Inspectors to those interested in code revision matters. The proposed changes make up a booklet of 83 pages and cover suggested changes in all articles of the code. Largely the changes suggested are proposed in the interest of more concise and definite wording and to include requirements for new materials and conditions which have arisen since the code was prepared originally. The basic idea of good wiring remains the same. Among the new features proposed is the use of bare copper conductor for a neutral. A universal system of grounding is also proposed. Another section would prohibit the use of plates and shallow boxes in concealed work.

Severe Strain on Elevator Pumps



Severe operating conditions result when water pressure must be kept constant over ever varying conditions such as in the tanks for hydraulic elevators. The 250-hp. and 275-hp. motors and compensators in this picture are located in the St. Francis Hotel, San Francisco, elevator pump plant. The compensators are controlled by E. C. & M. pressure regulators. This plant has been in service for over five years with only changes in contacts being necessary. It is estimated from service records that 40,000 contacts have been made in each case before the change of contact has been necessary. The normal service on this equipment is an average start and stop once every two minutes.

In the recently built new home of the Business and Professional Women's Club in Oakland, electricity is used to advantage. Electric heat is used extensively. Two 6-kw. heaters are used in the lunchroom, a 3 1/3-kw. heater in the den, a 4 1/5-kw. heater in the lounge, five 6-kw. heaters in the auditorium and a 6-kw. heater in the hall. The offices of the club are also wired for electric heating. An electric dishwasher is used in the kitchen. The pictures above show (left) the hall heater, and (right) one of the auditorium heaters. The Newbery Electric Corporation of Oakland made the wiring installation.

Where Controlled Heat Is Required Electric Is Preferred

For Enameling, Finishing, Sherardizing, Branding, Impregnating and General Melting Uses Electric Heat Is Finding Advantageous Application

By J. R. WILSON*, Quality Electric Works, Los Angeles

Electrical Estimating Series XXII

CONTINUING a review of some of the uses and possibilities of electric heat, it will be found that this form of heat has many applications in industrial plants requiring special processes of manufacture in which heat plays a part. As an example the manufacture of automobile bodies may be cited.

Finishing Processes

Electric heat can be applied to the drying of paint, varnish, enamel and japan, baking of armatures, automobile parts, file cases, piano and cash register parts, to the Bauer-barffing of telephone parts and kindred methods of finishing equipment. Where this heat is used handsome appearance, durable surface, improvement in product and a lower unit cost are the results usually obtained. Each finish, filler and lustre requires a distinctive method of heat treatment with a predetermined range of temperature to be maintained if satisfactory results are to be obtained. Automatic electric control maintains the desired temperatures with an absolute minimum of operating attention.

In the finishing of high-grade automobiles the heat treatment has been refined to such a degree as to be entirely automatic. Upon closing the doors of the oven the current is automatically turned on. The degree and duration of heating temperature is regulated and maintained throughout the predetermined length of time by the automatic control system. At the end of this period the heat is shut off, and a bell rings to notify the operator. All danger of too low a heat, resulting in a long drying period, or too high a heat, causing loss of lustre and liability of cracking, is thus eliminated. This method also safeguards against fire due to the inflammable nature of the japans, varnishes and enamels usually used.

Sherardizing

To render metal parts rustproof baking them in zinc dust (sherardizing) is now a universally used process. The use of electric heat has greatly improved this process because the coating of zinc is absolutely uniform. This is true even on corners and sharp angles and as a consequence no cracking or flaking results. When the articles are put through a process of buffing a finish almost equal to nickel plate results.

A micro-photograph of a piece of steel which has been sherardized presents a very interesting study in permeation of the steel by the zinc. The durability of the rust preventative coating is dependent upon the degree of interpenetration. In a first class job of sherardizing the zinc is thoroughly "rooted" into the steel, and though microscopic cracks, caused by expansion and contraction due to temperature change, may be apparent, they are too small to permit the entrance of moisture.

Branding

Leather, paper, wood, rubber, bristol board, textiles, etc., can be branded with a trade name or device very easily and quickly with the aid of electric heat. Walnuts, oranges, bread, and rolls, and numerous other food commodities are also being successfully subjected to this process. This method is much quicker and cleaner than printing, stenciling or labeling and the imprint is permanent. The temperature of the electrical heating device is maintained continuously and it can be used at any point where a lighting socket is available.

Melting Substances

Electric heat finds its greatest industrial application (in small units) when used in the process of melting substances. Such substances as glue, putty, solder, etc., are used in almost every line of industrial activity, glue perhaps taking the lead. This substance is used in the manufacture of furniture, paper boxes, shoes, books, pianos, radios, automobiles, airplanes, etc. The glue used in the manufacture of these products generally requires the maintenance of a temperature of 160 to 170 degrees of heat to obtain the best results. Electric heat, combined with automatic control, best serves to keep the glue at the desired temperature. Some automobile factories use as many as 150 glue pots each.

Usually the melting of glue and putty is accomplished by means of a "water bath," the substance to be melted being placed in one metal container and immersed in another metal container partially filled with water. This second container has electric heat applied to it by means of externally attached "strip" or unit heating elements, or by means of immersion heating elements placed in the water. The household double boiler is a good example of the type of construction used. Many of these glue and putty heaters are built in large sizes, and are used in large sash and door and furniture factories.

* All rights reserved by the author.

The writer has built putty heaters consuming 3,000 watts and holding 100 lb. of putty.

Everyone of course is familiar with the electric soldering iron. It permits continuous work without interruptions for reheating or changing irons and thus saves much time. Its uniform heat produces more even soldering and there is no risk of fire or explosion such as exists with the plumber's blow-torch. These irons are made in many sizes and with many shaped tips to meet all requirements. Jewelers, tinners, plumbers, electricians, canners, battery builders and repairers, manufacturers of radio equipment and other manufacturers all have found that the electric soldering iron meets a real need and are universally adopting it.

Impregnating Processes

Successful treatment of roofing papers and similar products depends upon the tar compound being held at a uniformly correct temperature. Again electric heat and automatic control must be mentioned as the only really satisfactory method of meeting this need. Perfect impregnation throughout the entire roll of paper being treated is assured when electric heat is used.

Where the production of electric products of high dielectric strength are the objects sought, the process can be carried on in large vacuum impregnating tanks. Some of these tanks are as large as 8x10 ft., electrically heated and controlled. By this method the coating substance is forced deeply into the insulating material and has proved very economical in unit production cost. Electric heat largely is replacing the former systems using high pressure steam.

Paraffining Processes

In melting paraffine with which to coat paper and other materials, electric heat has proved ideal. Modern containers designed to hold liquids are now manufactured largely of paper, formed to the desired size and shape and coated with paraffine to render them paterproof. Numerous brands of food commodities are now being packed in paraffined paper. Other uses to which this process has been adapted is in the manufacture of milk bottles, bottle and jar caps, drinking cups, ice cream dishes and other food containers made of heavy paper and cardboard. Many automatic machines for forming and coating these containers now are in use. These machines all make use of electric heat because of the advantages to be gained over fuel heat. Among these are smoother product, due to even temperature, simpler operation and increased cleanliness.

In Flux

No list of the uses to which electric heat may be put can be anything but incomplete. New uses for this form of heat are being developed every day. It is only safe to say that electric heat will ultimately find a place in every mechanism having as its purpose or utilizing in its processes accurately controlled and cleanly heat. Because electric energy is subject to innumerable forms of automatic control it may be said in the broad sense that it may eventually supplant every form of control requiring timed and automatic operation.

Laundries

No modern laundry would be complete without electric heat. The many operations necessary in finishing precludes the use of any but electric heat. The rapidly increasing use of silk undergarments, which require extreme care in handling to guard against damage due to overheating of the irons used, has opened an ever increasing field for electrically heated ironing units.

Electric hand irons are made in such a wide variety of sizes (1 lb. to 20 lb.) that a size to meet the requirements of any fabric is now available. Collar ironing machines, bosom ironers, electric drying ovens and other special types of finishing machines employing electric heat now are used largely by all laundries. These machines all produce a better product, make for lower room temperature and tend to make for a more contented working force than is possible with any form of fuel heat.

Shoes and Leather

In the manufacture of shoes and other leather goods electric heat has proved much more economical and satisfactory than other forms of heat. Cartridge type units re attached to the wax melting pots on stitching machines; special electrically heated shoe drying machines are used; machines for reinforcing shoe linings make use of electric heat; electric ironing machines for putting on the finishing touches—all of these are very extensively used in the shoe manufacturing industry.

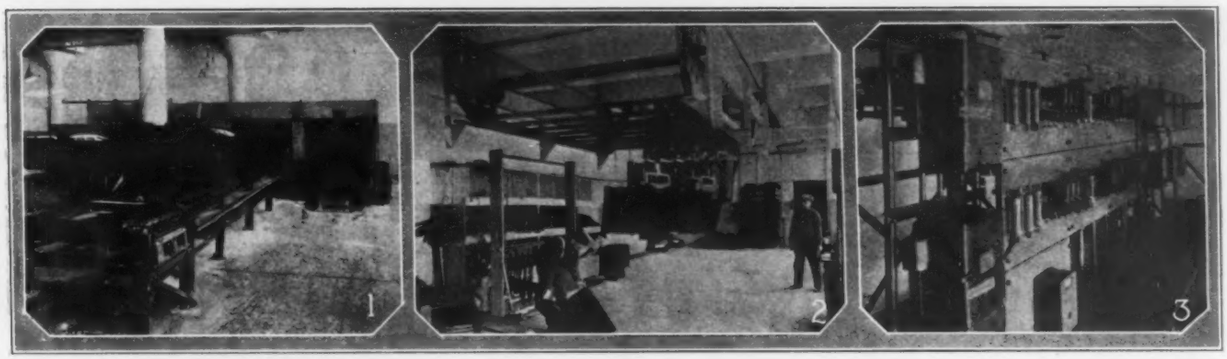
In other leather goods manufacturing plants, extensive use is made of electric glue pots and other electrically heated containers for melting wax, varnish and various liquid and semi-liquid substances. All manner of stamping, embossing and burning machines, electrically heated, also are used. Electrically heated pyrographic needles and tools for hand wrought leather goods are quite extensively used by certain manufacturers.

Baking Abrasives

In order to form the abrasive particles into a cohesive mass, it is necessary to place them in a mold subjected to carefully regulated heat until the mass has reached the desired condition. Unless the regulation is kept within carefully prescribed limits the operation will fail. An uneven application of heat will produce a faulty product. Due to the exactness of control which can be maintained electric heat is ideal for this manufacturing process and is rapidly superseding other forms of heating.

Other Uses

No claim is made for completeness in this recital of the possibilities of electric heat in industry. A large volume could be written on the subject of its possibilities in the metal working field alone. New devices and processes are constantly being placed upon the market.



At the Durant Motor Company's Oakland plant electric heat is used in connection with enameling of automobile bodies. (1) A three-compartment tunnel, conveyor type oven, 250 ft. long for baking enamel on automobile bodies. Temperature is maintained at 480 deg. F. The total connected load is 630 kw. (2) The control board of the three compartment tunnel. (3) The discharge end of a continuous conveyor type oven for baking enamel on automobile parts. Temperature is maintained at 490 deg. F.

Better Merchandising

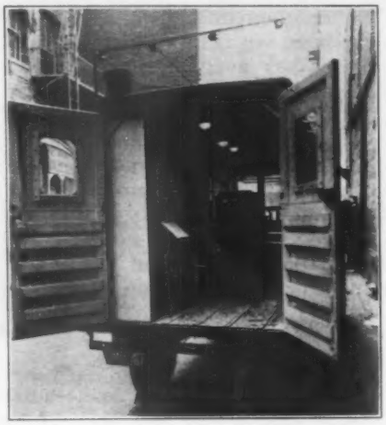
Radio Service Car Delivers the Goods

Bright Blue Auto of Newbery Electric Calls Attention to Company's Service Facilities and Provides Traveling Emergency Shop for Repairs

By D. D. McFarlane, Secretary-Treasurer, Newbery Electric Company, Los Angeles

RADIO is becoming more and more a staple article in the electrical dealer's itemized statement of merchandise. Like any other appliance the dealer is required to do a certain amount of servicing in order to give satisfaction to his purchasers. With radio, this question of service sometimes becomes a thorn in the flesh. And yet there is no reason why it should be anything but a medium of keeping customers satisfied with the establishment which has sold them the merchandise and a means of bringing them back when they want anything else electrical. The actual experience of this company in its radio service car set-up illustrates this fact better than mere theorizing.

To get at the beginning of this story it will be necessary to explain that formerly a small Ford truck with a box body was used for delivering radio sets, which was found fairly satisfactory while the sets were of smaller size—before the event of the cabinet designs now used. But because this truck was painted black it resembled more the dead wagon of a morgue than a radio dealer's vehicle, and in effect may have caused the radio service department to be dead.

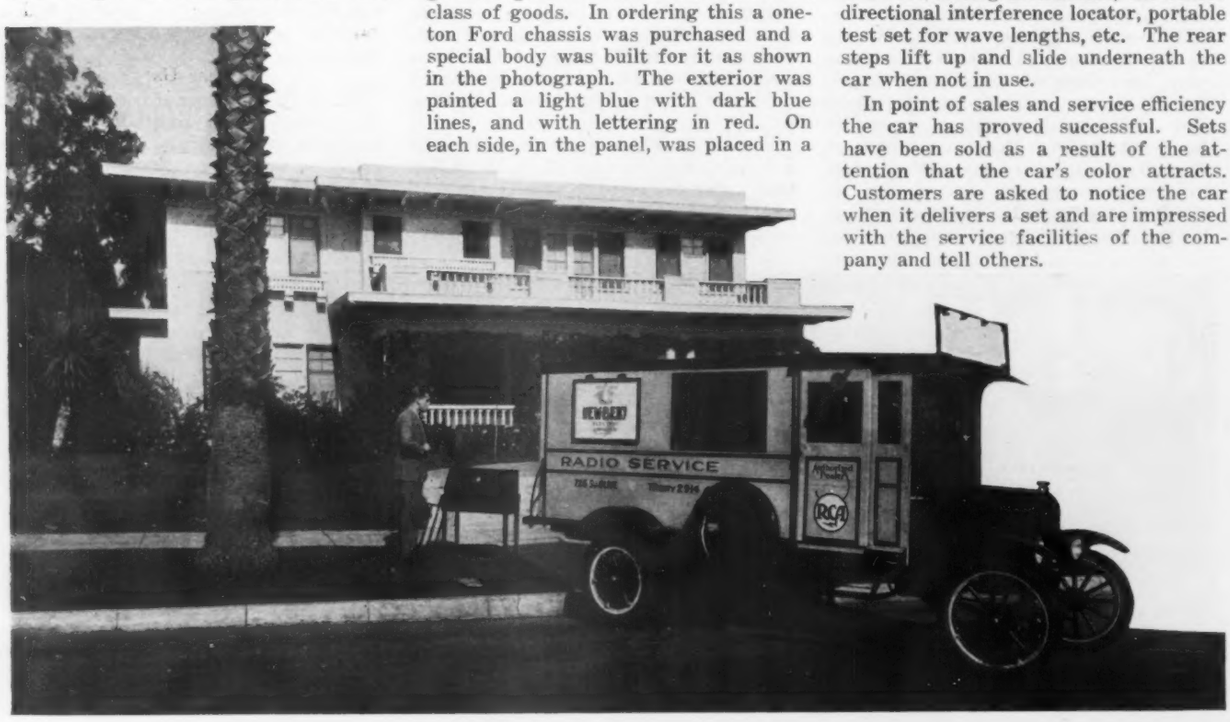


Interior of the radio service car as it is fitted up for storage of extra parts and for making minor repairs and tests.

When the cabinet type of radio became popular it was found necessary to get a larger truck to accommodate this class of goods. In ordering this a one-ton Ford chassis was purchased and a special body was built for it as shown in the photograph. The exterior was painted a light blue with dark blue lines, and with lettering in red. On each side, in the panel, was placed in a frame one of the company's Newbery trademarks which are metal job signs for use on all construction work, and on the sliding door the authorized dealer RCA trademark was placed to tie in with advertising and window displays. On the roof of the car we put an aerial which is used in testing out sets on the job as well as for drawing attention to the car. In addition the Newbery Electric Company's name was painted on the black top of the car so that the advertisement can be read from office buildings as the car drives along the business streets.

In the interior it will be noted that the rear doors open full width and that a cabinet is built on the left-hand side containing bins with locks to accommodate tubes, batteries and accessories needed on the job, so as to eliminate the necessity of a return trip to the store for some small article that may have been overlooked when leaving. Also will be noted three instruments, one on the smaller work bench in the car and the other two in black cases on the floor. The one on the work bench is a tube-testing instrument, the others directional interference locator, portable test set for wave lengths, etc. The rear steps lift up and slide underneath the car when not in use.

In point of sales and service efficiency the car has proved successful. Sets have been sold as a result of the attention that the car's color attracts. Customers are asked to notice the car when it delivers a set and are impressed with the service facilities of the company and tell others.



The

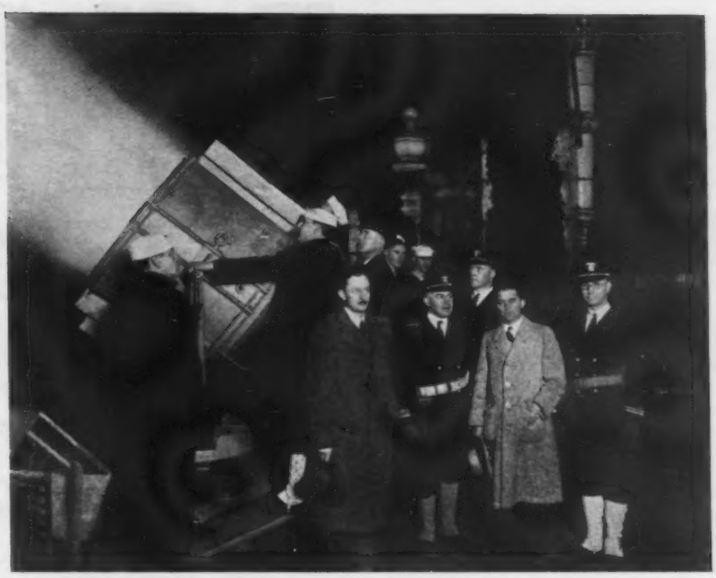
Navy Stole the Show

But it Made the Spectacular Searchlight Opening a Still Greater Attraction

WHEN the Navy goes so far as to take the show away from the management then may the management be sure that it has won official recognition. Not only that, but it may be assumed safely that when the navy decides to steal the stage it will add to the attraction no little interest. Such at least was the experience of a theater management in Seattle which used a spectacular searchlight display to attract the crowds to its opening night. The navy also took heed and determined to use the equipment for the staging of a show of its own. Commandeering the searchlight equipment it not only gave its own show but made the theater's performance one not to be forgotten for some time in Seattle.

Harold Horne of the Greater Theaters, Inc., has the task of opening new theaters for his company. Mr. Horne is thoroughly sold on the idea that light is the most effective method of attracting crowds for theater openings. In opening the Broadway Theater in Portland, his advertising campaign was built around light. He turned out a crowd of over 80,000 to this opening. When he opened the Fifth Avenue Theater in Seattle he advertised, "Come down and see the lights." At this opening over 90,000 people crowded the streets, surrounded the theater and put on a carnival.

When it came to opening the United Artists Theater in Seattle, the advertising campaign was built up on "Watch the Skies." It was decided to open the theater with the picture, "We're in the Navy Now." In order to tie the "Watch the Skies" slogan into the picture with light, Lyman Day Morgan, illuminating engineer with the Pittsburgh Reflector Company in Seattle, was called into consultation. It was decided to put on a searchlight display from the roof of the theater. The searchlights would tie in with the slogan and with the navy.



L. D. Morgan, illuminating engineer, Lieut. Commander George D. Grant, Harold Horne and Lieuts. MacAdam and Farwell, as the Naval Reserves took possession of the light barrage from the roof of the theater.

Light in advertising finds its most spectacular use in searchlight play. For special occasions it is unequaled. This is a story of the taking over of a display by the navy to stage a mimic air raid.

But they had not counted on the 13th Naval Reserve's district commander, George D. Grant. Commander Grant watched the preparations. When the equipment, which consisted of fourteen 19-in. Carlysle Finch searchlights with a beam candle power of 600,000, three 36-in. G.E. searchlights with a beam candle power of 3,600,000 and twenty Pittsburgh floodlights with a beam candle power of 350,000, was installed, he decided that this would furnish an opportunity to try out an airplane attack against a light barrage, and proceeded to steal the show. He mobilized the first battalion on three hours' notice, captured the roof of the theater and staged the airplane attack.

It was estimated that over 100,000 people watched the spectacle. Mr. Horne is more than ever sold on the idea that light with the added element of motion will sell a theater location quicker than any other thing.

It is interesting to note that it took 120 kw. to feed the searchlights.

A Clean-up on Washers

A California Washing Machine Sales Organization Has Taken the Guesswork Out of Selling

HOW do I know how much of this product I can sell? How can I get salesmen? How can I make them work? How can I keep them? What should I pay? These questions still bother the mind of the average dealer and still form the basis for a large part of the programs of electrical conventions. But an organization with from 200 to 300 salesmen continuously in the field has through the very force of necessity had to solve them.

The Maytag Company of California is a retail sales organization operating throughout the northern section of the state with headquarters in San Francisco. Some four years ago it started the selling of washing machines. From that small beginning it has grown until during the past year it sold 12,000 machines. For 1927 its quota has been set at 21,000. This in spite of the fact that 70,000 washing machines of the Maytag make have already been sold to California housewives during the past four years and that it might be presumed the market was reaching the saturation point. The sales organization varies from 200 to 300, depending on the sales drive in progress and the turnover in the ranks is very small. The company knows to a dot how many washing machines it will sell; it knows how many sales people it will take to sell them, and it knows how many calls each man will have to make to attain the result.

The Answer in Figures

How does it know it? Every large manufacturer knows through a careful analysis of his market just about how much of his product will be absorbed by a given population. The insurance company knows how many men will die at a given age and how many will be destitute. The cigar store knows in advance how many people will pass its door. These companies know these things by applying the law of averages. The same law, derived from experience, will show that a community of a given population will absorb a given number of washing machines for a given time period, that a salesman can make just so many calls a day and that a given percentage of these calls will result in sales. Every company has a factor of its own to apply, but every company can figure out the unknown element for itself and solve its own problem by simple arithmetic.

The same process of arithmetic which thus answers the question "How shall I know the quantity to buy in advance?" also gives the number of salesmen who will be required. When it comes to selecting material, it has been found that a salesman is better picked out by the branch office in the district in which he is to serve. He is less apt to be restless and to pass on when he gets tired of the job, and what is more, he starts with a circle of acquaintance and a knowledge of the community which stand him in good stead. There is no one class of people who make good salesmen, rather it is a type. They may have been teachers, cowboys, stenographers or lawyers in their former reincarnations, but they must have character and personality and they must show a capacity for enthusiasm and for work.

Selling on Commission

When it comes to the question of pay, the Maytag Company of California is convinced that the straight commission basis is the most satisfactory, starting with the premise, of course, that the commission is sufficient to provide an incentive for good work. With $25 allowed for each machine sold, it has been found that an average salesman can make in the neighborhood of $200 a month steadily. By extra effort he can make more and there are of course many in the organization who habitually earn a return much higher than this. A system of bonuses and prizes keeps the sales force on its toes and does much to solve the question of how to keep the men at work. The adequate answer to this problem implies the answer as well to the question of how to keep down the labor turnover, for a man who is earning good money is one who is not anxious to give up his job.

Part of the policy of the company is to give publicity to its sales organization stunts and to the rewards which are given its salesmen on the theory that this will attract others to the ranks. In one instance a poster showing the fifteen highest salesmen in a six weeks' sales contest and the total sums earned by them in this period was posted in each branch office, proving an excellent incentive to present salesmen and an inducement to others to join the ranks.

Sales Promotion Activities

The sales promotion work, which is under the personal supervision of Mr. Norman Olson, sales manager of the Maytag Company of California, is one of the most important departments of the business. Something is under way at all times to stimulate sales. An attractive house organ published under the name of "It All Comes Out in the Wash" is issued by the personnel of the sales staff and gives the records of the best salesmen and stories of "how I did it." Quotas and percents attained by each sales district are also given, an

EXTRA!

All Trains Are Under Way

Clear the Right of Way | SPECIAL EDITION OF THE WASH | Clear the Right of Way

ORIGINATED AND EDITED BY NORMAN OLSON

SAN FRANCISCO, CALIF., OCTOBER 14, 1926

TRAIN CREWS CONFIDENT OF MAKING TIME

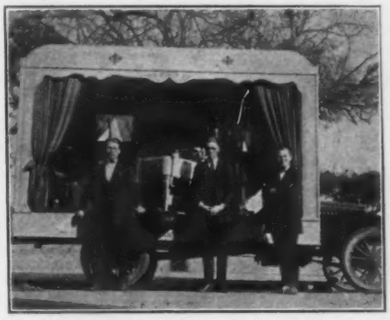
The house organ published by the Maytag Company keeps salesmen pepped up and gives them credit for their achievements.

Engineer Smith and Fireman Davis, having an overall Cleanup after their run to Reno

item which keeps the district managers up to mark. Silver and gold buttons reward record sales, as well as published pictures and an official ceremony of award.

In addition, contests and stunts are on at all times. When it is not a bonus offered for all sales above a certain number, it is a cash prize award for the highest sales in a given class or district, or a grand prize to the entire staff of a section winning highest. In one contest bets between the districts were encouraged and augmented by the company. In each case, the reward is sufficiently great that it is worth special effort to win. One salesman has the record of $1,875 for six weeks' work, made up of commissions and prizes.

The contests which the company has staged have always been spectacular and entertaining, so that they appear as a game and good fun to the participants as well as an opportunity for serious work. They are presented through the mail and by word of mouth in local sales meetings and they are kept up in every detail. Where costumes are possible, costumes are worn and local color in conversation, in sales literature and in store decoration is kept up so far as possible.



Display wagon carrying machines to places of public gathering and from which sales are made.

"The Treasure Hunt" was one of the most successful of these races. In this case each man was to reckon himself a pirate in search of the buried treasure. He was given a chart of the journey and a small chest containing the tools of his trade—pick-axe, shovel and broadsword. Later on he was furnished by mail with a small top-gallant sail which bore the legend "Extra Effort Wins." Pirate letter heads and pirate terminology were used throughcut the period.

Publicity is a great factor in all these campaigns. Some 400 pages of newspaper advertising accompanied a single one of these drives. Outdoor boards are used to good effect, 260 of them being owned in the northern section of the state, the copy on which is changed every 30 days. Each one of the contests is a publicity stunt in itself and not only attracts the attention of those who pass the stores or who chance to see some phase of its activity, but also secures newspaper attention.

The public is aware that a big thing is going on. And nothing succeeds like success.

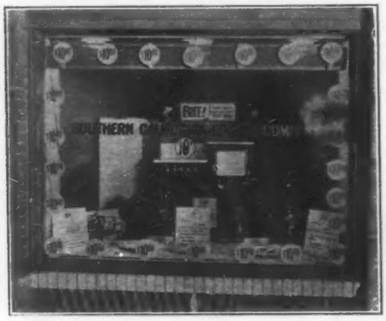
A number of the clever sales campaign ideas which are set forth attractively and designed to arouse new interest in each successive campaign for greater sales.

Will Your District GET THE CUP?
See that Your Letters and Broadsides go out PROMPTLY
Follow Them up
A Personal Call!
IS THIS YOU?
I'M LUCKY!
He means he worked hard!
This campaign covers the ENTIRE Edison System
Why You Will Win
15 CASH PRIZES
YOURS?
Prepare a PROSPECT LIST! —AND LIST IT!
CALL ON A FIXED NUMBER of PROSPECTS EVERY DAY!
See Them. Sell Them. but SEE THEM!

Edison Flying Squadron Sweeps on to Range Sales

Main Office Sales Show-Troupe Swings the Circuit and Shows District Organizations Principal Features Which Make for Quick and Easier Sales

SELLING through its own sales organization a total of 659 electric ranges in a period of five weeks, directly to individual household consumers, the Southern California Edison Company



Sample window, trimmed and photographed to give working model for all districts to copy.

has just closed an electric range campaign which has set a new record for merchandise sales for this organization. This campaign had as its total quota the sale of 450 ranges, and the actual sale of 659 exceeded expectations by almost 57 per cent.

Beginning the last week of October and continuing through the month of November up to the third day of December, a concentrated drive was made in all districts of the company's organization.

The Southern California Edison Company serves a territory lying in ten counties in southern California, comprising approximately 312 cities and towns, with a total population of approximately 2,500,000 people. This territory is divided up by the Edison company into 31 geographical districts, each district constituting a separate distribution organization. For the most part each of these districts has one merchandise salesman, although there are districts having two such men. In this campaign no outside help was used except that of two field men of the manufacturer.

In laying out the plan for this sale, it was determined to use three forms of advertising media: newspapers, direct-mail, and window displays. For the stimulation of enthusiasm in the sales organization itself, a number of generous prizes, both cash and merchandise, was offered. Each week four cash prizes were offered; a first prize of $25, second of $15, and third of $10 were paid to the three salesmen selling the largest number of Hotpoint electric ranges. A fourth prize of $10 was paid each week to the seller of the largest number of Hotpoint water heaters. The first grand prize for the entire campaign was a white enamel Hotpoint electric range given to G. M. Cox of San Bernardino for selling the largest number of ranges during the campaign. Mr. Cox sold 141 ranges. The second grand prize, a Thor ironer, given to the salesman selling the largest percent of his quota, was won by John H. Murphy of Visalia with a percentage of 400. Mr. Murphy sold 80 ranges. The third prize, a Royal vacuum cleaner, also went to G. M. Cox for selling the largest number of water heaters during the campaign.

District Sales Awards

To obtain the co-operation of every employee in the district organizations two direct means were employed. First a silver loving cup was offered to the district making the largest percentage of the quota. This cup was given by W. L. Frost, general commercial manager, who is in direct charge of all commercial activities of the Edison company. Second, each salesman was urged to offer a bonus of $2.50 for every prospect furnished him by employees, provided the prospect became a sale during the five-weeks campaign. This suggestion was adopted enthusiastically by the salesmen and proved to be particularly effective in actual sales results. It is interesting to note that of the 31 dsitricts, 21 equaled or exceeded the quota set for them.

In setting quotas for the various districts, great care was exercised to make them as fair and as equitable as was possible. The total number of resident consumers and the type of people in

Second mailing piece, large broadside, sent Nov. 4.

SOUTHERN CALIFORNIA EDISON COMPANY
$10 PLACES THIS RANGE IN YOUR HOME . . . .
Ten Dollars means you will cook Your Thanksgiving Dinner by ELECTRICITY!
DURING the month of November the Southern California Edison Company is making it possible for you to own a genuine Hotpoint Electric Range at bargain prices and on the easiest of terms. This sale opens Monday, November 1, and closes at midnight, November 30.
Cooking perfection is within the reach of all. Special low rate schedules for users of electric ranges make it possible for you to "cook by wire" at a cost which will surprise you.
In the manufacturing of these ranges no expense is spared to procure the very finest of raw materials, and all work. Ownership is up to the high standard always maintained by Hotpoint.
FREE SPECIAL PREMIUM
Every buyer of a range during this sale will receive FREE this beautiful HEDLITE HEATER. FREE
$7.50 HEDLITE HEATER FREE
Phone or Call at Our Nearest Office
SOUTHERN CALIFORNIA EDISON COMPANY
A Million Families Cook Electrically . . . Join these Happy Families

First broadside, mailed Oct. 28, starting campaign.

SOUTHERN CALIFORNIA EDISON COMPANY
Busy Buttons
Like Having a Maid at No Cost
THIS SPECIAL SALE WILL CLOSE DEC 1st RAIN OR SHINE
FREE
This Beautiful HEDLITE HEATER Given Free with Each Hotpoint Range
Phone or Call at Our Nearest Office
SOUTHERN CALIFORNIA EDISON COMPANY
A Million Families Cook Electrically . . . Join these Happy Families

Third mailing piece, sent Nov. 10.

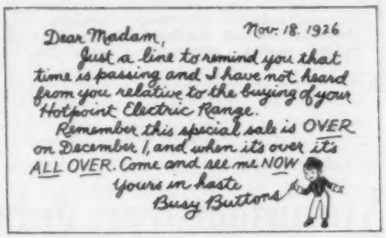
each territory was taken into consideration.

Prices used in the campaign were the regular price schedules in effect throughout the year. A special low down payment of $10 was the only monetary inducement offered.

Newspaper and Direct-Mail Advertising

With but two exceptions, only one paper was used for advertising in each district. Each district manager designated the paper covering that particular section of his territory which offered the greatest sales possibilities. For the daily papers selected, a small advertisement, one column by five inches with a distinctive border, was prepared. One such advertisement was used for each day during the campaign. While it was realized that this small announcement would not have the attention value of larger copy, it was thought that the constant repetition day after day would counteract this shortcoming and with the assistance of the attractive and unique border would make the advertisement do the work for which it was intended.

For the weekly papers, a two column ten-inch advertisement was used for each week of the five-weeks campaign. A total of twenty-two daily advertisements, or 110 in. of space, therefore, appeared in the daily papers, while the weekly papers carried a total of 100 in. Simultaneously with the publication of these articles in the papers, a series of four direct-mail pieces was sent to a selected list of 30,000 possible range buyers. These lists were made up in the district offices by the district managers who, knowing their own territories, were able to select easily a list suitable for such direct-mail solicitation. On the 28th day of October a four-page letter was sent out. This letter told the story to the woman of the house, and introduced the idea of the campaign. The day following the receipt of this letter the newspapers throughout the territory carried their first advertisement. On the 4th of November a second mailing piece was sent out. This was a little larger than No. 1, and did not include any letter, but was primarily a broadside which gave the story in pictures, and in bold type told of the possibilities of the electric range, and the advisability of purchasing one at this time and under these advantageous terms. Letter No. 3 went out on the tenth of November and was similar in size and make-up to piece No. 1, carrying a further urge to action and going a little more into detail concerning the superiority of electric range cooking over any other method. Direct-mail piece No. 4, which was mailed on Nov. 18, was a postcard printed in script carrying the story of action, Action, ACTION—there was no time for delay. A postcard was selected for this medium because it in itself was thought to symbolize speed.

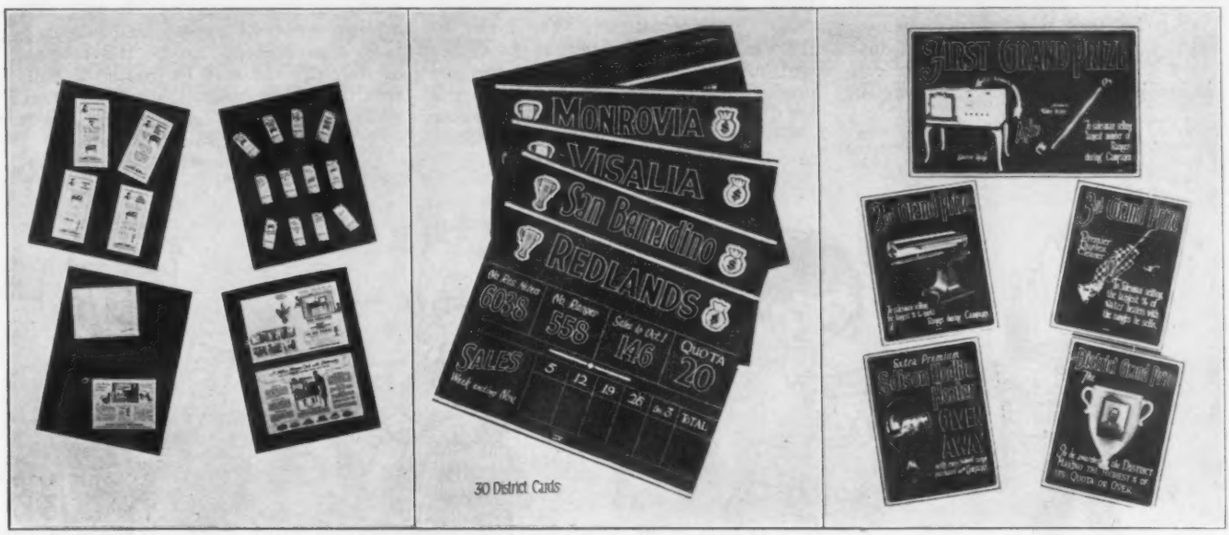

Nov. 18. 1926
Dear Madam,
Just a line to remind you that time is passing and I have not heard from you relative to the buying of your Hotpoint Electric Range.
Remember this special sale is OVER on December 1, and when its over its ALL OVER. Come and see me NOW
Yours in haste
Busy Buttons

This postcard was the final shot fired.

As an assistance to the districts in trimming their windows, a sample window was first trimmed and photographed and a copy of the photograph furnished each district. In addition to this service a complete set of window-trim material furnished by the Edison Electric Appliance Company was also supplied to each district in quantities sufficient to fill every window.

The "Flying Squadron"

In presenting this campaign to the district organization, the time honored method of a circular letter of instruction was supplemented by the visit to



Cards carrying proofs of advertising copy and photographs of prizes for the range campaign mounted for display at the "pep-'em-up" meetings. One of the large cards was prepared for each district showing number of residence meters, number of ranges in use, number of ranges sold during 1926 up to Oct. 1 and quota for the campaign.

each district by what has been termed the "flying squadron." Beginning just one week before the campaign opened, this squadron, consisting of P. H. Booth, representing the Edison Electric Appliance Company; H. C. Rice, manager of merchandising for the Southern California Edison Company, who was directly responsible for the entire campaign, and R. G. Kenyon, assistant advertising manager of the same company, made a call on every district office and explained the entire plan to all employees contacting the public in a sales capacity. Two field representatives of the Edison Electric Appliance Company, L. A. Francis and J. W. Carpenter, alternated as members of this flying squadron. Carefully pre-arranged schedules made it possible for the district managers to have all interested members of their own forces assemble at the proper time ready to hear the story upon the arrival of the flying squadron. Careful adherence to this pre-arranged schedule made it possible for the squadron to address five or six of these assemblies a day thereby covering the 31 districts of the company in record time. Approximately 1,110 miles were traveled by these sales emissaries in making the complete circuit.

April for Percolators

April is Percolator month. National advertising should be capitalized upon to make it the month to sell your biggest volume of these appliances. Decorate the old window. Feature the coffee quality electrically percolated.

This traveling sales promotion group carried with it considerable equipment which served as stage settings for the meetings in each district. Before the journey was undertaken each district's quota had been hand-lettered on a large show card—30 x 40. This card showed in addition to the quota of ranges to be sold during the campaign the actual number of resident consumers in the district, the number of electric ranges which had been sold in the district during 1926 up to the opening date of the campaign, and the total number of ranges actually in use in the district. In addition to these quota cards a set of large show cards for each of the three speakers was made up. These cards carried upon them in attractive lettering the actual notes from which the speakers made their talks, thus letting the audience **read**, as well as **hear** the points which needed emphasis. Complete sets of all advertising matter were displayed on similar cards. Photographs of the grand prizes had been taken and so enlarged as to require the putting together of two large show cards to make possible their being mounted. These were sure-fire, interest-getting pieces of "scenery."

Direct-Mail for Manufacturer, Jobber and Retailer

Why Each of These Branches of the Electrical Industry Should Reach the Consumer by Mail is Shown by Recent Analysis of Results

By JEAN BLUM*, Manager, Blum's Advertising Agency, San Francisco

YOUR general advertising program builds good-will and creates interest. A very large percentage of this interest is either passive or lukewarm. All it needs to develop it into actual sales is the proper kind of follow-up material by mail.

Your product may have excellent merit. It may appeal to the readers. It may be just what your consumer prospect wants. But that is a long step from determination on the consumer's part to go out to the various electrical dealers and examine the article. The little personal touch—by mail—often bridges the gap between passive interest and a definite desire to own or possess the particular article.

Do Manufacturers Get Dealer Interest?

Too many manufacturers rely upon their dealers' interest for ultimate sales to the consumer. Too many of them take it for granted that the dealer will put himself out to feature the one product. The fact is, however, that the average dealer is too engrossed in other problems, has too many other articles to sell, to put himself out.

Every dealer, however small or large, is interested in sales. If the manufacturer's advertising proves a means of bringing customers into his store he is always keen to take advantage of the fact. But you can't expect the average dealer to present all the salient sales arguments about your product to his customers and prospects. He may have a large supply of a competing manufacturer's product on hand. His interest in your product may be limited to calls resulting from your publication effort, while his sales-effort may be easily swayed in favor of something else.

Dealer sales promotion by mail over-

* Address given before the Advertising-Publicity Section, Pacific Coast Electrical Association, San Francisco, Sept. 10, 1926.

"I'll have to look into this." "Looks good, but no time today." "How does it compare with others?" "Just what I want. Must get one."

comes many sales-resistance evils. Modern business has discovered that it is not enough to sell a dealer a quantity of goods, the manufacturer must go a step further in helping that dealer dispose of his goods. Dealer sales-promotion must be planned in advance. It is the most effective sales-tool that a manufacturer can employ. It is the most logical follow-up to any advertising campaign and usually results in increased sales.

The Jobbers' Use of Direct Mail

Now let us get to the jobbers' and the industrial contractors' side of the use of direct-mail in electrical advertising. This group deals mostly with the industrial and business field, the largest single group of consumers.

The advertising usually consists of space in trade publications and periodicals, some national magazines and technical trade papers. Here again the jobber and the industrial contractor should be taken into confidence by giving them a complete outline of the advertising campaign, its dates of publication, reprints of advertisements and suggested sales letters which are to be mailed to a definite list of prospects.

These letters should call attention to the reprints which should accompany each series. They should deal with the technical and economical factors of the machinery or equipment featured, and if at all possible, two of the series should contain examples and comparisons of what the equipment has accomplished in the industrial field. Four page, illustrated letters are ideal for the purpose.

Business people are interested in economical factors. A letter accompanied by a questionnaire relating to the prospect's particular problem, offering to make a survey without cost to the firm, will develop many leads for future installations.

In this type of direct-mail it is best to limit the material to that of an informative nature. Eliminate sales-pressure. That had best come after the prospect shows the slightest interest.

The average electrical contractor has well over 800 prospects in his immediate trading area. He cannot afford to employ a sales force to call upon all of them regarding a given type of equipment. But he can well afford to use the mails for the purpose of developing worth-while inquiries.

So much for the contractor's and jobber's side.

Now the Retailer

Let us now consider the retailer's use of direct-mail in electrical advertising.

The retailer must rely upon three distinct methods for the purpose of intensifying sales.

1. **Personal salesmanship**—both from within his store and by outside sales people.
2. **Direct-mail follow-up** material supplied by the manufacturer—wherever he can secure such material.
3. **Direct-mail material prepared by himself,** or, if he is a large dealer, prepared by his advertising counsellor.

Over 95 per cent of the retail dealers rely upon salesmanship from within their stores. Employing outside salesmen is too costly and often too tedious to justify itself. Less than 5 per cent use sales promotion material which is available to them through the manufacturer, simply because that phase of selling-effort has not been properly presented to them. A few of the larger electrical supply dealers are progressive enough to prepare their own direct-mail material, while a large number of them limit their activities to the enclosing of envelope stuffers supplied to them with their monthly statements and bills.

> *"—if there is any one group in retail business that can and should employ direct-mail effectively it is the group of retail electrical supply dealers."*

If Anyone Needs It, Retailer Does

That is the condition which prevails in the retail field, according to my knowledge. And yet, if there is any one group in the retail business that can and should employ direct-mail effectively it is the group of retail electrical supply dealers. The electrical retailers' need for direct-mail effort is quite definite. Perhaps I can best illustrate this point by quoting a little analysis of what happens to the average reader of publication advertising as well as those in whom it has created passive interest.

Assuming that your advertising has favorably impressed 100 readers, the following is an approximation of the resistance channels through which it passes before actually accomplishing sales:

Fifteen of the readers conclude that this is "good value" and will look into it at the first opportunity.

Six of the readers have decided that "it is just what I want" and have come to examine the article and make a purchase.

Eleven of the readers are favorably impressed by the presentation of the facts, but decide this is not the time to buy.

Eight of the readers agree that the article featured is desirable to own, but make a mental note to compare the value with other articles and decide "some other time."

Thirty-five of the readers show passing interest. They comment that it is a good article, but show no particular interest in buying at the particular time.

Ten of the readers discuss the merits of the article with their friends and neighbors, and agree that it is worth having.

Twelve haven't the money just then, and while they would like to buy the article advertised, decide to wait until some other time.

Three of the readers are glad to know about the cost of the article, make a mental note of it, but are not particularly interested in buying.

Six per cent of the readers favorably impressed have actually bought the article advertised.

Fifty-nine per cent of the readers have been favorably impressed, but for reasons of their own, have not made a purchase.

Thirty-nine per cent of the readers have been sufficiently impressed to become merely lukewarm on the subject.

No one can deny the fact that "favorable impression" is a long way from determination to buy.

Does this analysis prove the need of direct-mail selling effort for both retailer and manufacturer? In my opinion, it certainly does. Furthermore, it puts up the problem of how to "cash in" on the passive interest created by all forms of advertising effort. It demonstrates that while advertising produces its quota of sales, there is a large percentage of favorable interest and goodwill that is lying dormant, waiting for some additional force to turn that interest into actual sales.

Over 90 per cent of your advertising effort falls short of making a sale, simply because nothing more is done to keep interest alive and influence the reader beyond the first impression.

(Concluded next issue.)

"Interesting, don't you think?" "Must talk this over with Mae." "Hafta wait 'til I get money." "Pretty fair, I reckon."

News of the Industry

Further Reduction in Price of Mazda Lamps Announced

Announcement has been made that, effective April 1, a further reduction will be made in the price of Mazda lamps. This reduction, made possible by universal acceptance of the inside-frosted lamps and the nearly complete elimination of forty-five types of lamps formerly manufactured for home-lighting needs, is the ninth in the past six years and the third since the introduction of the five inside-frosted lamps in February, 1926. It brings the average price of Mazda lamps down to 49.4 per cent less than in 1914 and places the 50 and 60-watt sizes at 25 cents, by far the lowest price in history.

The difference between the 1921 prices of clear lamps in the sizes most used for home-lighting and the present prices of inside-frosted lamps is shown in the following table:

Size	1921 Clear Lamps	1927 Inside-Frosted
25 watt	$ .40	$ .23
40 watt	.40	.23
50 watt	.40	.25
60 watt	.45	.25
100 watt	1.00	.40
Total	$2.65	$1.36

Edison Company Adopts New Type of Bungalow Substation

The Southern California Edison Company has completed a new type of bungalow substation which is to be used wherever it is necessary to install substation equipment in residential territory. To date three of these stations have been completed and placed in operation. So closely does this type of structure resemble the ordinary dwelling that the ordinary passerby cannot identify it as a substation.

On the high side the voltage may be either 11 kv. or 15 kv., the low side sending out current at 4 kv. All circuits enter and leave the station underground. The maximum installation which is contemplated is three 1,000-kva. units. As this station was designed to be operated without an attendant, automatic reclosing mechanisms are installed on all outgoing 4-kv. feeders. Actual cost of construction of a station of this type is approximately 25 per cent more than the cost of the ordinary substation.

An electrical home—the new type of bungalow substation adopted by the Southern California Edison Company.

No Water Rights to Be Granted on Colorado River

Washington Correspondence

One of the last bills passed by the Senate before adjournment was the resolution directing the Federal Power Commission to issue no permits or licenses under the water power act, "upon or affecting the Colorado River or any of its tributaries in the states of Colorado, Wyoming, Utah, New Mexico, Nevada, Arizona and California, until and unless the Colorado River compact, signed at Santa Fe, N. M., Nov. 24, 1922, has been approved by the Congress of the United States, or in the event that the compact is not sooner approved, until March 5, 1929."

The resolution had support in both the upper and lower basins of the Colorado. The upper states were anxious to prevent the possibility of establishing prior rights in the lower states and there was also the desire to make certain that no rights were acquired which would pave the way for the construction of the Boulder dam.

The resolution effectively padlocks the entire Colorado Basin. No rights may be granted on even the minor tributaries, regardless of the fact that such projects would have no bearing on the Colorado River situation.

After successfully running the blockade in the Senate the amendment to the Water Power Act, which would have allowed the Federal Power Commission to hire its own personnel, failed of passage in the House. The interstate and foreign commerce committee considered the resolution during the closing days of the session but did not act upon it.

Annual Public Relations Contest Announced by Magazine

Announcement is made by Forbes Magazine, 120 Fifth Avenue, New York, of its annual public relations contest conducted in co-operation with the N.E.L.A. The award will be given for the most constructive public relations campaign carried on by a light and power company in a local territory during the past year, the data submitted to cover plan of campaign and how conducted; exhibits of all types of advertising and literature used; record of achievement as indicated by customer-ownership results, increased use of appliances, increased sales of light and power; data indicating growth of good will.

The contest closes April 20 when all exhibits and papers must be in the offices of the magazine at the address given, and the award will be made at the N.E.L.A. convention in Atlantic City June 6.

Priest Rapids Construction Term Extended by Two Years

Deferment of the construction period for two years has been allowed the Washington Irrigation & Development Company in connection with its license for the development of Priest Rapids on the Columbia River. It was pointed out at a meeting of the Federal Power Commission that the applicant has expended considerable sums on the project in studies looking to the development of a market for the power. The extension in time is asked so that these studies may be continued. The license prescribes that the construction work is to commence on or before March 5, 1927, and to be completed to a capacity of 320,000 hp. on or before Dec. 31, 1931. These limits are extended for two years in the amendment which the commission just has allowed.

The commission canceled the preliminary permit extended Nov. 6, 1925, to the Appleton Land, Power & Water Company, Los Angeles. The permit covered a project on Deep Creek in San Bernardino County. The cancellation was asked by the applicant who was not in a position to comply with the conditions of the permit.

R. H. Woods, of Lordsburg, N. M., has applied to the Federal Power Commission for a preliminary permit covering a project on the Gila River in Hidalgo and Grant Counties, N. M. The plan contemplates the construction of five power houses and storage reservoirs. This would make available 50,000 hp., it is estimated.

Utah Bill Declares Colorado River Navigable in Utah

The signing by Governor Dern of Utah of Senate Bill No. 12, introduced by Senator Herbert Auerbach, which clarifies Utah's stand on the navigability of the Colorado and Green Rivers, places the state of Utah on record as opposed to any interpretation of the seven-state compact that would declare the streams unnavigable.

Introduction of the bill was due to controversy that arose in the Senate over the interpretation of the meaning of paragraph (a), article 4, of the Colorado River compact. This paragraph begins with the words "Inasmuch as the Colorado River has ceased to be navigable for commerce." As there was some question whether Utah's ratification of the seven-state compact would place the state on record as holding the Colorado River no longer navigable for commerce while tons of freight are being transported by this stream to the oil fields near Moab, Utah, monthly, Senator Auerbach decided it would be to the interest of Utah to clarify the state's stand on the matter and this bill was introduced.

The bill declares that the paragraph referred to is not to be construed as, and is not intended as, a declaration of intrastate policy in derogation of the rights and policies of the state. The act also declares that the Colorado River in Utah and the Green River in Utah, and such tributaries of those two streams as are navigable in fact for any useful purpose, to be navigable streams; that the waters of the two streams and tributaries named are public waters, and that the state asserts its title to the bed of such rivers, and any tributaries navigable in fact for any useful purpose.

Combined Budget of $20,000,000 Set for Three Utilities

A budget of $20,000,000 for construction and operation has been set for the Great Western Power Company of California and the San Joaquin Light & Power Corporation, which are controlled by the Western Power Corporation of New York, and the Midland Counties Public Service Corporation, a subsidiary of the San Joaquin company.

As announced by A. Emory Wishon, vice-president and general manager of the three companies, $10,506,135 has been allotted to the Great Western Power Company, of which $8,307,135 is to be spent on construction work and $2,199,000 on operating costs. One of the important items in the construction program is the building of a 220-kv. steel-tower transmission line from Brighton substation near Sacramento to the Bucks Creek plant of the Feather River Power Company. The Great Western company has contracted for the output from the Bucks Creek plant for thirty-five years, and at the end of that period the plant becomes the property of that company. Nearly $2,350,000 will be spent on new distribution lines and substations throughout the territory.

The San Joaquin company's budget provides for $8,555,385, of which $4,122,485 is for construction work and $432,900 for operating expenses. The construction budget is below that of 1926, but last year's program included the building of the Balch power plant on Kings River, which has just been brought on to the lines. This plant, with 40,000 hp. capacity, gives the company ample power for the immediate future, and no new plant construction is required for this year.

Another Red Seal Home

The electrical installation in the Red Seal home of F. E. Kenaston, nine miles west of Chowchilla, Calif., has a load of 24 kw. The house, in accordance with Red Seal requirements, is well equipped with electrical labor-saving devices, including hot-water tank and cabinet range. A 5-hp. motor pumps water from a well for the domestic supply and for irrigation around the house. Approximately 1,000 acres are under cultivation on the Kenaston place, and this entire acreage is irrigated by electric pumping.

Edison Company Orders Eleven Large Transformers

Two contracts covering four 33,333-kva. transformers and seven 25,000-kva. transformers, respectively, for the Southern California Edison Company have been placed with the Westinghouse Electric & Manufacturing Company. These units will be manufactured at the Sharon Works for delivery during the coming spring and summer. The 33,333-kva. units are the largest single-phase transformers to be built from the standpoint of kva. All of these units are to be single-phase, self-cooled, air-blast, for use on the 220-kv. system of the Southern California Edison Company.

The 33,333-kva. larger transformers go to the new Sunset steam plant of the Southern California Edison company for which Stone & Webster, Inc., of Boston have acted as consulting engineers. They will transform the generator voltage of 16-kv. to the 220-kv. system voltage and will be more than 99 per cent efficient at all practical operating loads.

Each transformer, completely set up, weighs more than one hundred tons, and from the top of the high-voltage bushing to the ground measures 400 in.

The seven 25,000-kva. transformers go to the Lighthipe substation and will be used to connect 220-kv. and 60-kv. transmission systems. They are similar in construction to the four larger units.

West Kootenay Company Starts Work on Third Plant

Rock excavation work will be started about April 1 on No. 3 plant of the West Kootenay Power & Light Company to be located on the Kootenay River at Bonnington Falls, about 12 miles below Nelson, B.C., according to L.A. Campbell of Rossland, B.C., vice-president and general manager. The plant will have a generating capacity of about 60,000 hp., giving the company a total capacity of all plants of 152,000 hp. About eighteen months will be required on the construction, at which 650 men will be employed, he stated. The plant will have three units, with water wheels operating under a head of 75 ft. Three 24,000-hp. turbines have been ordered from the Allis-Chalmers Company, and the contract for the generators and switches has been let to the Canadian General Electric Company. The order for the transformers has not yet been placed.

Power will be supplied principally to mines and a smelter of the Consolidated Mining & Smelting Company of Canada and other mining properties in that district.

Service Badges Presented to Power Company Employees.—The annual presentation of badges to employees of the Pacific Gas and Electric Company who have been in the service of the company for ten years or more took place recently. Among those who received the award were P. M. Downing, vice-president in charge of electrical construction and operation, with a record of twenty-five years; J. P. Coghlan, assistant to the vice-president and general manager; Miss Bertha J. Dale, assistant manager of the personnel department, and Miss Margaret Holton, who have been with the company twenty years; R. E. Fisher, vice-president in charge of public relations and sales, Miss Margaret E. Dolan and Miss Josephine O'Connell, each of whom has served the company fifteen years. Presentation was made by Frank A. Leach, Jr., vice-president and general manager.

Extensive Load-Building Program for 1927 Is Planned by Edison Company

With a new business quota for 200,700 hp. the Southern California Edison Company through W. L. Frost, general commercial manager, has announced an extensive load-building program for 1927. The quota for the year includes 105,700 hp. in industrial power load, 45,000 hp. in cooking and heating load and 50,000 hp. in lighting load. It compares with an actual load added in 1926 of 185,000 hp. In the domestic load-building field quotas of 2,500 electric ranges, 1,600 water heaters, 1,500 refrigerators and 17,900 lamp socket appliances have been set.

Merchandising activities, under the direction of H. C. Rice, general merchandise manager, have been divided into four major classifications, exclusive of small appliances. A water-heater campaign concentrating on the 4,000 electric range users not having water heaters was inaugurated in January and has been completed. Beginning March 1, sales effort was concentrated on a Westinghouse electric range campaign similar to the campaign undertaken last November. Reports indicate that this campaign will be highly successful. Beginning May 1, a campaign on refrigerators will start to continue through the summer months. In addition to standard units the company plans to devote considerable attention to remote installations with the idea of electrifying the better class of ice boxes already in the homes of consumers. Sept. 1 will mark the inauguration of a Hotpoint range campaign following closely the campaign previously undertaken. A feature of this campaign will be the holding of seventeen newspaper cooking schools in the territory of the company.

Ranges and water heaters retailing at less than $165 will be sold at list prices, with an initial payment of 20 per cent and terms not exceeding eighteen months, allowing dealers to co-operate on the same terms. Wiring of ranges and water heaters will be handled by the contractor-dealers in the various districts, and the program allows a standard wiring price to be arranged between district managers and contractor-dealers so that an installed price may be quoted to the customer.

During the year a series of special sales will be held featuring lamp-socket appliances. These campaigns are to extend over a period of forty-five days. Beginning Feb. 1 waffle irons were featured at a cash price of $7.95 and a terms price of $8.95 with $2.95 down and the balance in three equal monthly installments. Excellent results from this campaign were reported by power company, dealers and jobbers, not only with the waffle iron featured but with all lines. From April 1 to May 15 a percolator will be featured. Extensive plans are being made for an electric cooker campaign to be held from June 1 to July 15. One of the features of this campaign will be a continuous series of demonstrations in all of the sixty-one district offices by competent demonstrators. Electric irons will be featured from Aug. 1 to Sept. 15. An innovation in this campaign will be the featuring of one iron at a special price and a standard iron at list price. The appliance for the period from Oct. 1 to Nov. 15 has not been selected. From Dec. 1 to Jan. 15, 1928, electric toasters will be featured. The same procedure will be followed in this campaign as with electric irons, two different types being offered.

All of these special campaigns are set up to allow for maximum co-operation with the contractor-dealers. Sales meetings will be held throughout the territory prior to the campaigns for the purpose of interesting the dealers, and all advertising material will carry the message "Purchase this appliance from the nearest Edison office or from your dealer." Jobbers also are co-operating. Further to assure a satisfactory tie-in with the contractor-dealers, provision has been made whereby all financing for installment sales made by them may be handled through the Edison company.

Washing machines, ironers, and vacuum cleaners are to be handled on the resale plan. All sales crews will be under the direct supervision of the Edison company's merchandising organization. Advertising collections and term paper will be handled by the Edison company. In all districts except Long Beach the Electric Household Utilities Corporation is distributing Thor washers and ironers on this basis, and Listenwalter & Gough are handling the Royal vacuum cleaner. In the Long Beach district the Easy Housekeeping Shops are distributing the washing machine manufactured by the Syracuse Washer Company, the Graybar ironer and the Premier Duplex cleaner.

Salesmen in the merchandising division will be paid on a salary and commission basis. They will receive a salary of $100 per month, transportation to be furnished by the salesmen, and commissions will be paid on the following scale: refrigerators, 8 per cent; ranges and water heaters on the lines, 10 per cent; ranges and water heaters requiring extensions of more than one pole, 5 per cent; appliances and lamps, 10 per cent; heavy duty commercial cooking and heating equipment, $1 per kw. connected. Through an arrangement with the companies operating on a resale basis, salesmen and employees reporting prospects who purchase washers or ironers will receive a bonus of $5 and those reporting vacuum cleaner prospects who purchase will be paid $3. A special scale of commissions has been arranged for saleswomen demonstrators.

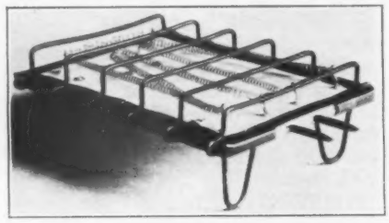
The company plans to handle commercial refrigeration to the extent of electrifying ice boxes of present commercial customers where standard equipment can be installed. All jobs requiring special equipment or extensive engineering will be turned over to manufacturers' representatives.

The entire merchandising campaign is to be backed up by an extensive advertising campaign, both newspaper and direct mail. In addition, a portable exhibit has been prepared for use in all county and local fairs in the territory of the company.

In the industrial power and commercial and industrial lighting field, a corps of twenty-eight sales engineers under the direction of A. W. Childs, new business manager, will be used. Twenty of these men are power sales engineers and eight are illuminating specialists. An extensive industrial and commercial lighting program has been outlined for the year. These lighting experts will be supported in the field by an illustrated lecture on light that will be put on before the luncheon clubs and various meetings as recommended by the lighting committee of the P.C.E.A. These sales engineers are expected to develop new business in their own particular lines, which they will turn over to the local dealers in their respective districts. They will work in close co-operation with the local contractor-dealers and all work thus will benefit the entire industry.

Electrical Inspector Stops Sale of Non-Approved Toaster

Indicative of the efficacy of that provision of Portland's municipal electrical code prohibiting the sale of non-approved electrical appliances, the manager of a store in Portland recently was haled into the municipal court and fined



The sale of this non-approved toaster was stopped in Portland under a provision of the Portland code.

$25 for selling an electric toaster. Complaint was entered against the store by J. C. Caine, deputy electrical inspector, who has charge of the enforcement of this provision of the code and of the administration of the dealer's license provision. It is understood that this was not the store's first offense.

The device, which sold for 15 cents, was characterized by Mr. Caine in court as "one of the most dangerous life and fire hazards" he had ever seen in the city.

Budget of $4,320,000 Set for Six Northwest Utilities

A construction budget of $4,320,000 for 1927 has been set for the Pacific Power & Light Company and for the five utilities operated by it in Oregon, Washington and Idaho, namely, Inland Power & Light Company, Lewiston, Idaho; Deschutes Power & Light Company, Prineville, Ore.; Grangeville Electric Light & Power Company, Grangeville, Idaho; Enterprise Electric Company, Enterprise, Ore.; and Sherman Electric Company, Moro, Ore.

The most important items in the Pacific Power & Light Company's budget include the rebuilding of the Naches-Pasco 66-kv. line, the erection of two district substations at Astoria, substation changes to increase capacity due to growth of business, and rebuilding several distribution systems to take care of increased load. Nearly 50 per cent of the budget total covers the extension of facilities for securing additional business.

The larger part of the Inland company's expenditures will cover items in connection with the company's new plant on the Clearwater River, which is expected to be placed in operation about the middle of the year. The electric distribution lines at Clarkston and Lewiston will be rebuilt, the new plant upon completion will be connected with the present transmission system at Clarkston, and some rearrangement of the present transmission line layout in the vicinity of Lewiston will be effected.

The budgets for the other companies will be spent almost entirely for the improvement of transmission and distribution systems. It is planned to increase the voltage of the transmission line from Wallowa Falls to Enterprise from 11 kv. to 22 kv. A 22-kv. transmission line will be built from DeMoss Springs in Sherman County, Ore., in an easterly direction through Olex to Ione, with a line north from Olex to Arlington and south from Olex to Condon. Its completion will make available energy from The Dalles-Hood River system for these communities and will replace diesel engines at Arlington and Condon and a small steam plant at Heppner. Substation facilities will be provided at Arlington, Condon and Ione.

California Oregon Company Sets $4,800,000 as 1927 Budget

Announcement has been made by the California Oregon Power Company, Medford, Ore., that it has adopted a budget of $4,800,000 to cover its construction program for 1927 and to provide enlarged and improved facilities.

Of this amount about $3,250,000 will be used in the construction of Prospect No. 2, a hydroelectric plant on the North Fork of the Rogue River, which will have an initial capacity of 22,000 hp. and an ultimate capacity of 66,000 hp. (Electrical West, February, 1927, p. 107.) A new high-tension line will be built from that plant to Medford.

Memory of Hydroelectric Pioneer in California Honored

Memorial to H. H. Sinclair

A 10-ton boulder which rests on a knoll overlooking Mill Creek Plant No. 1 of the Southern California Edison Company recently was dedicated by officials of that company as a memorial to Henry Harbinson Sinclair. The bronze plate affixed to the big rock bears the following inscription:

In Memory of
Henry Harbinson Sinclair 1858-1914
A testimony to his high and useful
service as a pioneer
in the establishment
and development of the
hydro electric industry in California
This tablet erected by the
Southern California Edison Company

H. H. Sinclair was in charge of the construction of the first three-phase long-distance hydroelectric plant in the world, the Edison company's Mill Creek Plant No. 1 situated about seven miles cut of Redlands, Calif. This plant, which was completed in 1892, is still in operation. With the support of Henry Fisher of the Redlands group of hydroelectric pioneers Mr. Sinclair carried through this work to a successful conclusion.

At the dedicatory exercises John B. Miller, president of the Edison company, and B. F. Pearson, manager of industrial relations of the same company, made addresses. Both Mr. Miller and Mr. Pearson are veterans in the field of electrical development in California, Mr. Pearson having been actually employed at the plant in the early days, while Mr. Miller began as treasurer of the company in 1898.

Sherman Electric Company Buys Utility Properties

The passing of another small municipal plant to private operation was announced recently in the purchase of the municipal plant at Arlington, Ore., by the Sherman Electric Company. The purchased plant consists of 175 hp. in oil engines and 155 kw. in generator capacity, and a 220-volt d.c. distributing system covering the town.

Other recent purchases by the Sherman Electric Company include the Heppner Water, Light & Power Company, serving Heppner, Lexington and Ione, Ore., and the Condon Electric Company, serving Condon, Ore. All of these properties, including Arlington, are to be tied in with the system of the Sherman Electric Company at 22 kv. this summer. The ownership of the Sherman Electric Company recently has passed to the interests allied with the Pacific Power & Light Company, Portland, and it is now being operated by that company.

Permit Issued for Two Projects in Douglas County, Ore.

A preliminary permit has been authorized by the Federal Power Commission for the California Oregon Power Company covering two projects involving five sites on the North Umpqua and Clearwater Rivers in Douglas County, Ore. Since the filing of the application the Geological Survey has completed a profile of the two rivers showing that the sites covered by the applications are not the only ones which appear attractive. A condition of the permit is that a complete investigation of the power possibilities of both streams, within the project area, be studied.

The preliminary permit issued June 14, 1924, to the American Alum Corporation of New York, for a power project on the Gila River, has been cancelled. The commission took this action after having been advised that the corporation had failed to do the necessary stream gaging work and to comply with other terms of the preliminary permit.

Metcalf Power Bill Defeated in Washington State Senate

The Metcalf Bill, designed to permit cities with municipal plants to sell energy for light and power outside their corporate limits, has been defeated in the Washington state Legislature by a narrow margin.

The measure would have allowed cities to sell municipal power to other cities within fifty miles of the corporate limits of the seller and twenty-five miles from its transmission lines, and to concerns within fifteen miles of its transmission lines and within ten miles of its city limits. A tax of 5 per cent on gross earnings would have been assessed for all power sold outside the city, except to other municipalities.

Importance of Public Relations Stressed at New Mexico Utilities Convention

The twelfth annual convention of the New Mexico Utilities Association was held in Albuquerque Feb. 14-16. Street railway, water and telephone company representatives as well as electrical men from the states of Wyoming, Colorado, New Mexico and Texas were in attendance.

Although there was a number of papers of outstanding merit, covering a varied list of topics, delegates could not help but be impressed by the fact that every talk or discussion was permeated with the subject of public relations to a greater or less degree. The inference is not made that this subject has received an insufficient amount of attention in the Mountain States territory but rather that much has been accomplished by the industry because of its consideration of the public in all of its activities, and that this condition should continue to even a greater extent to the ultimate good of both the public and the industry.

J. B. LEDLIE
newly elected president

GEORGE E. LEWIS
made one of the opening speeches

A talk, "Have Our Associations and Committees a Mission?", given by O. A. Weller, secretary of the Rocky Mountain Division, N.E.L.A., and one by George E. Lewis, Rocky Mountain Committee on Public Information, on the subject, "Some Bets We Have Overlooked," served as the opening guns of the convention. Both of these speakers stressed the necessity of public enlightenment of the industry's problems of construction and distribution, and of its program of expansion. The importance of educating the youth of today was brought out by Mr. Lewis. Mr. Weller referred to the recent franchise election of the Public Service Company of Colorado, which was won by a majority of two and a half to one, indicating the degree of confidence which the public has placed in an industry which has come to recognize the importance of frankness and openness in its activities.

An address by Dr. James F. Zimmerman, acting president of the University of New Mexico, probably provoked more discussion than did any other paper presented during the convention. Dr. Zimmerman outlined his views as a student of government and stated that his investigations led him to believe that state commission regulation of utilities eventually will become general throughout the country. To substantiate his belief he maintained that a utility, operating in several communities, best can render a service to the public through uniform regulation by the state rather than by the municipalities. Likewise did he stress the need for closer co-operation between the educational bodies and the utilities.

J. A. Clay, Western Colorado Power Company, Durango, reviewed twenty years of progress in rural electric service and anticipated the time when the policies regarding financing rural extensions will become standardized.

ARTHUR PRAGER
was in charge of entertainment

One entire morning session was taken up with the activities of the Commercial and Public Relations Sections, Rocky Mountain Division, N.E.L.A. Messrs. Fred Norcross, Home Gas & Electric Company, Greeley, and Frank Jamison, Public Service Company of Colorado, Denver, presided. Recent developments in domestic electric refrigeration and the danger to utility business of the income warrant bond predominated the discussions.

J. J. Cooper, president of the Mountain Electric Company, Denver, spoke on "The Jobbers' Place in the Picture." In this talk Mr. Cooper outlined the pioneering activities of the industry, leading up to the realization on the part of the manufacturer that he had a problem of distribution that later was worked out satisfactorily by the establishment of the jobber, who today is an economic necessity.

The highlights of league activities were touched upon by George Bakewell, Jr., executive manager, Electrical League of Colorado. Mr. Bakewell confined the greater portion of his talk to the desirability of having all central-station executives co-operate with the contractors in their territories in an effort to develop team-work and to establish electrical home exhibitions and Christmas outdoor lighting activities as annual features of the central stations' programs.

Miss Inez Thompson, Public Service Company, Denver, discussed the importance of the N.E.L.A. Women's Committee's activities, and urged all utility executives to co-operate with the national and local committees.

Two hours were devoted to Engineering Section work of the Rocky Mountain Division, N.E.L.A. P. C. Schools of Durango presided. A paper by H. H. Kerr of the Public Service Company of Colorado occupied the most prominent place during this session. Mr. Kerr's address reviewed the four power surveys that have been made and brought out the importance of such activity.

A varied program of entertainment was arranged by Arthur Prager, manager, Albuquerque Gas & Electric Company. He was assisted by Mrs. Prager and Mr. and Mrs. L. B. Wiles.

GEORGE BAKEWELL, JR.
discussed league activities

Officers elected to serve during the coming year are: president—J. B. Ledlie, Mesilla Valley Electric Company, Las Cruces, N. M.; vice-president—C. C. Ogle, Agua Pura Company, Las Vegas, N. M.; vice-president—W. W. Nielsen, New Mexico Power Company, Santa Fe, N. M.; secretary-treasurer—L. B. Wiles, Albuquerque, N. M.

Mr. Ledlie, who until his recent election to the presidency was first vice-president of the New Mexico Utilities Association, has had many years' experience in the utility business.

In 1909 he entered the employ of the Northern Texas Traction Company, Fort Worth, Texas, as ticket agent. Three years later he was promoted to the position of assistant electrical engineer, and in 1917 was appointed electrical engineer. In 1921 he became sales manager of the El Paso Electric Railway Company, El Paso, Texas, resigning that position in 1924 to assume the duties of superintendent of the Mesilla Valley Electric Company, which position he now holds.

News Briefs

National Electrical Manufacturers Association Creates Range and Water Heater Section.—The National Electrical Manufacturers Association has authorized the creation of a new section, to be known as the Range and Water Heating Section. It is the aim of the association to have all manufacturers of electric ranges in the United States become members of this section. Its purpose is the co-operative solution of manufacturers' merchandising problems, and to this end it will work with a similar committee of the National Electric Light Association. M. C. Morrow, assistant sales manager of the merchandising department, Westinghouse Electric & Manufacturing Company, has been elected chairman of the new section.

Japanese Activities in the Electrical Field.—The Fuki Electric Power Company recently was incorporated in Tokyo with a capital stock of 25,000,000 yen, according to Denkinotomo. The Tokyo Electric Light Company is carrying on an aggressive lighting campaign and has planned a construction program which includes the development of five sites along the Nagasegawa River to generate 60,000 kw. and of three sites along a branch of the Fujigawa River to produce 2,400 kw. The Taiwan Electric Power Company is planning to build a steam plant at Takao and another at Daihoku with a total capacity of 10,000 kw.

Edison Medal Award Declined by Dr. Coolidge.—Dr. W. D. Coolidge, assistant director research laboratory, General Electric Company, to whom the Edison Medal for 1926 had been awarded "for the origination of ductile tungsten and the fundamental improvement of the X-ray tube," has declined the award for the reason that Juge Hugh Morris of the United States district court of Delaware had ruled that Dr. Coolidge's ductile tungsten patent was invalid. The Edison Medal committee acquiesced in Dr. Coolidge's decision and therefore there will be no Edison Medal award for 1926.

Puget Sound Company Plans Raising Baker River Dam.—The Puget Sound Power & Light Company, Seattle, has asked the Federal Power Commission for license to occupy additional space at the site of the Baker River dam in Whatcom County, where the company proposes raising its dam an additional 30 ft. during 1927 at a cost of $100,000.

Uintah Company Elects Officers.—At the annual meeting of the Uintah Light & Power Company, held at its offices at Myton, Utah, the following officers were chosen for the coming year: W. H. Colthorp, president and director; J. H. Reader, vice-president and director; George E. Adams, secretary and director; Walter M. McCoy, Willis L. Johnson, Abner Richens, directors; H. C. Emert, treasurer and director. Plans were considered for improving the company's system.

Transmission Line Franchise Granted by Lewis County, Wash.—The Willapa Electric Company, Raymond, Wash., has secured franchise from Lewis County for a network of electric line extensions throughout the county, furnishing service to many districts hitherto unserved. Franchise is for fifty years. The Lewis County commissioners also have granted to the People's Utility Company of Rochester, Wash., franchise for twenty-five years to construct five miles of transmission lines on Lincoln Creek in northwestern Lewis County.

Pacific Coast Electrical Association

Contest of 3-Minute Speeches to Be Held at Convention

Further to stimulate interest in public relations among the workers in the electrical industry one of the features of the P.C.E.A. convention will be a contest of three-minute speeches to be held Tuesday, June 14, in Santa Cruz, according to announcement of S. Waldo Coleman, president of the association. This activity is being sponsored by the Advertising-Publicity Section, and Richard E. Smith, advertising manager, Southern California Edison Company, as chairman of that section is in charge of the details. The official announcement follows:

1. The subject to be discussed is, "What factor has the greatest influence upon the public's attitude toward the public utility?"

2. Each member company will have the privilege of sending one contestant to appear in the final contest.

3. The Electrical Development League of San Francisco, The Electric Club of Los Angeles, and the Electric Club of San Diego will be entitled to one entrant each and will select their representatives from members of the Pacific Coast Electrical Association who are not affiliated with any central station.

4. The final contest will be held at noon Tuesday, June 14, in Santa Cruz.

5. The prize awarded to the winner of the final contest will be $100 worth of stock in the company he represents plus a suitable souvenir of the occasion. If the winner is not connected with any central station company, he may indicate which company's stock he refers. This prize will be furnished by the Pacific Coast Electrical Association.

6. Member companies and Electric Clubs who care to give trips to the convention to more than one of their own people making a favorable showing in the elimination contest may do so, but only one entrant from any company or any Electric Club will be allowed to appear in the final contest.

7. The final contest will be judged by a committee of three in Santa Cruz, in no way associated with the electrical industry.

It is suggested that each member company and each Electric Club immediately take steps leading to elimination contests in their own organizations and that each company give the winner of such elimination contest the trip to the convention as a prize. The winner will then have the opportunity to appear in the final contest and compete for the grand prize worth approximately $125. The only requirements of the elimination contests are that the presentation must not take longer than three minutes—that is to say 180 seconds—and that it must conform to the theme, "What factor has the greatest influence upon the public's attitude toward the public utility?"

This contest is open to all men and women in the electrical industry affiliated either with a central station or one of the electric clubs mentioned. It is suggested that each of the three electric clubs invite to their contests any member of the Pacific Coast Electrical Association who may not be affiliated with one of these electric clubs or any central station. For example, an electrical contractor in Long Beach might participate with the Los Angeles Electric Club or a jobber in Oakland with the San Francisco Electrical Development League. It is not necessary for an entrant to be a member of the Pacific Coast Electrical Association during the elimination contest, but all those appearing in the final contest at Santa Cruz should apply for membership before competing.

Schedule of Engineering Section Meeting Is Announced

Following is the schedule of the third group meetings of the Engineering Section, P.C.E.A., to be held in Fresno April 6-8 in the San Joaquin Power Building, as announced by J. G. Rollow, chairman:

Committee	Wed. Apr. 6	Thurs. Apr. 7	Friday Apr. 8
	a.m.	a.m.	a.m.
Accident Prevention	9:30	9:30	
Electrical Apparatus		9:30	9:30
Hydraulic Power	9:30	9:30	
Induc. Co-ordination			9:30
Meters	9:30	9:30	
Overhead Systems	9:30	9:30	
Prime Movers			9:30
Safety Rules			9:30
Underground Systems			9:30
		p.m.	p.m.
Luncheon (general) Hotel Fresno		12:15	
Executive dinner Hotel Fresno		6:00	
Dance, Power Building Auditorium			9:00

Reservations should be made direct with the Hotel Fresno, mentioning the Pacific Coast Electrical Association.

Good Progress Reported by Committees at Commercial Section Conclave

Preliminary presentation and discussion of the 1926-27 committee reports were the principal features of the second conclave of the Commercial Section of the Pacific Coast Electrical Association in Los Angeles March 9-10, 1927. Approximately 165 utility commercial men and manufacturers' and jobbers' representatives attended the two-day sessions. The conclave followed the precedent set earlier in the year by holding a general session with several outside speakers.

Excellent progress was reported by all of the committees. The customer relations committee, W. P. Graef, Southern California Edison Company, chairman, reported that plans have been completed for holding an essay contest similar to that conducted during the last association year. Prizes totaling $700 will be awarded to the winners in a contest on the subject, "The Proper Treatment of Our Customers," using as a basis the booklet published by the committee in 1925.

The Lighting Bureau, Clark Baker, National Lamp Works, chairman, reported the continuation of the talks on artificial light before 35 service clubs in 25 cities. The talk was given by members of the committee before 3,000 business men and by utility representatives before an additional 2,500. Five utilities have purchased equipment for the lecture. The committee also held a successful lighting school in San Diego with 49 enrolled, 60 per cent of whom were contractor-dealers. A survey of the paved highway systems of the state with a view to lighting them was completed by the committee and soon will be placed in the hands of the State Highway Commission. The report recommends the placing of 250-cp. lights on 250 or 300-ft. centers on all important highway sections.

The agricultural power committee, A. M. Frost, San Joaquin Light & Power Corporation, chairman, has made a study of possible methods of increasing the revenue from agricultural power extensions which at the present time represent a high investment per dollar of revenue. Encouraging the use of electric dairy sterilizers is one method of increasing consumption on these lines. Heavy rainfall momentarily has stilled the complaints of high pumping charges occasioned by the lowering of the water table in certain heavily irrigated districts, the committee reported.

The industrial heating committee, A. J. Cipperley, General Electric Company, Los Angeles, chairman, reported that it had supplemented the sales manual compiled last year, by conducting a series of tours of industrial districts with central-station executives as guests. The committee cited the installation of 10,000 kw. in industrial heating equipment in northern California during the last twelve months as representative of increasing interest in this field.

Preparation of a manual containing data on operation of specific commercial cooking installations has been completed by the commercial cooking committee. The committee in making a survey of the commercial cooking field reports the sale of 1,600 electric restaurant-type toasters with a capacity of 5½ kw. during the last four years with an estimated average revenue of $100 per toaster per year.

A study of the causes for the apparent lack of development of electric trucking load on the Pacific Coast was conducted by the electric transportation committee, K. I. Dazey, chairman.

The preparation of an electric refrigeration manual for use by all central-station employees who come in contact with the public was reported by the refrigeration committee, Gardner Buss, Pacific Gas and Electric Company, Oakland, chairman. This manual will be printed and distributed to the member companies of the association.

The electric range committee, P. P. Pine, San Diego Consolidated Gas & Electric Company, chairman, reported on range-servicing practices and costs. Servicing costs have decreased from an average of $5 per range per year to $3 during the past five years. The committee recommends that a fair charge be made for all servicing after the expiration of the manufacturers' guarantee period and that accurate records be kept of servicing costs and of the various types of complaints.

The merchandising committee, H. C. Goldrick, Graybar Electric Company, Los Angeles, chairman, has conducted a study of average residential consumption in the territory of the association that shows consumption for lights and appliances monthly of 341 kw-hr. per meter per year and 435 kw-hr. per meter per year for lights, appliances, ranges and water heaters. The committee reports that these figures can be improved through the encouragement by the central station of greater use of lamp-socket appliances.

The speakers at the general session were D. F. McGarrey, president of the Los Angeles Chamber of Commerce, W. G. Farrell, insurance man, E. N. Hurley, chairman of the board, Electric Household Utilities Corporation, and W. L. Frost, Southern California Edison Company, and vice-president of the association, whose paper was read by R. E. Smith. Mr. Hurley pointed to the extensive market for electrically heated ironing machines, stating that these machines will return to the power companies an average revenue of $14 per year. Mr. Frost's paper discussed the important problems facing the commercial men and dwelt at considerable length on the greater use of electric appliances by electrical men themselves.

The entertainment feature of the conclave was a banquet in the Chamber of Commerce Building where the sessions were held, at which H. L. Harper, Graybar Electric Company, presided. An informal talk was given by W. M. Baurhyte, president, Los Angeles Gas and Electric Corporation, past-president of the association. A splendid program of entertainment was provided by Glenn Rice, studio director of KNX.

Advertising Section Discusses Types of House Organs

A symposium on house organs, in which were discussed the various types of house organs published by the power companies of the association, drew a large attendance of advertising representatives and house organ editors from outside business enterprises to the meeting of the Advertising-Publicity Section of the Pacific Coast Electrical Association, Feb. 25, in San Francisco.

The morning meeting, presided over by Richard E. Smith, Southern California Edison Company, chairman, was taken up with business. The section discussed and decided upon the conditions of the three-minute speaking contest it is to sponsor for the Tuesday luncheon at the convention, details of which are published elsewhere. A session with the Commercial Section at the convention also was asked for.

S. Waldo Coleman, president of the association, speaking at the noon luncheon, likened the section to the intelli-

About one hundred and sixty-five central-station commercial men and manufacturers' and jobbers' representatives attended the Commercial Section conclave in Los Angeles March 9-10.

gence service in the army and urged the section to promote teamwork in the organization. Roy Cowles, program committee chairman for the convention, also briefly addressed the meeting.

The afternoon session, devoted to the symposium on house organs, was under the chairmanship of Frederick S. Myrtle, editor Pacific Service Magazine, Pacific Gas and Electric company. John P. Coghlan, assistant to the vice-president and general manager of the same company, was first to speak. He outlined the policies of the management with respect to the house publications of that company and described the scope of each, Pacific Service Magazine, P. G. and E. Progress, and the Pacific Service Employees' Association paper. Lively discussion followed Mr. Coghlan's talk.

Edward F. O'Day, editor of "San Francisco Water," house organ of the Spring Valley Water Company, then outlined the policies and plan of that company's house organ, a quarterly of high standards and rigid requirements. As with the previous talk, much discussion ensued, in which the factors of house organ technique were debated.

The next meeting of the section will be held in Los Angeles, April 11, when the subject to be discussed will be "Supplementary Advertising."

Northwest Electric Light & Power Association

Important Topics Excite Much Discussion at Engineering Section Meeting

Safety work, irrigation and power conflicts, radio interference, characteristics and treatment of insulating oils, standardization of line specifications, and treatment and life of poles were a few of the subjects exciting interesting discussion at the fourth annual general meeting of the Engineering Section, Northwest Electric Light and Power Association, at Portland, March 10-11, 1927. The section chairman, O. L. LeFever, general superintendent, Northwestern Electric Company, Portland, presided. Registration totaled 175.

Each committee was allotted a period during one of the sessions in which to present subjects pertinent to its work, and after the presentation of each formal paper the subject was opened to general discussion. Several visitors were invited to participate in the program, among whom was Maj. H. S. Bennion, engineering director, N.E.L.A., New York.

Inspection trips to the paper mill at Camas, Wash., and to the steam stations of the Portland companies were provided for Saturday, March 12.

In opening the second day's sessions W. W. Briggs, vice-president and general manager, Gray's Harbor Railway & Light Company, Aberdeen, Wash., stressed the necessity of full co-ordination between departments. He pointed out also that satisfactory service to customers depends upon imbuing all members of the company organization with a willingness to please.

Overhead Systems Committee

To determine the efficacy of instruments for live-line testing of insulators, the committee had arranged for these instruments to be tested at the laboratory of the Oregon Agricultural College, Corvallis. F. O. McMillan, associate professor of electrical engineering, who has been directing this work, presented a progress report.

The feasibility of using fire-killed cedar poles was discussed from the standpoint of cost, strength and lasting qualities by L. R. Gamble, assistant engineer, The Washington Water Power Company, Spokane. He pointed out that their life and strength probably were suitable for comparatively unimportant lines, but that their cost probably would not be much less than that of poles cut from growing timber, because of the greater cost of producing, manufacturing, cutting and storing them. His final conclusion was that their use would necessitate a revision of pole specifications, but would result in no material cost saving. Thus the only justification for their use would be conservation of the present supply of live cedar.

Standardization of distribution line construction and material was the subject of a paper presented by H. R. Wakeman, superintendent of wires and conduits, Portland Electric Power Company. He pointed out the advantages in construction, estimating, purchasing and storekeeping that could be gained through adopting a set of standards covering at least the ordinary distribution line construction. In a written discussion on the paper, C. D. Wood, general storekeeper, California Oregon Power Company, Medford, Ore., emphasized the safety features of construction standardization and the savings in store costs through standardized materials. R. J. Davidson, assistant engineer, Pacific Power & Light Company, Portland, in another written comment called attention to the fact that varying conditions in the territories of different companies required variations in the standards of those companies so that no single set of standards could be made to suit all. The points of view of purchasing agents, service men and safety engineers were expressed in turn to the effect that standardization was beneficial to these departments when the specifications did not restrict materials to the products of one manufacturer and when they were broad enough to permit the use of new material as developed.

N.E.L.A. Heard From

Maj. H. S. Bennion, N.E.L.A. representative, gave a newsy talk on a number of subjects of national importance. Mentioning the popular worry over the interstate aspects of power transmitted across state lines, he told the results of a 1925 survey which showed that only 6 per cent of all kilowatt-hours generated crossed state boundaries. Touching upon rural electrification he advised that the number of farms served had increased from 164,000 in 1923 to 325,000 in 1926, and that 90 per cent of the total farm power used in the United States is in the West.

Public Utility Commissioner Speaks

The program of the committee on co-operation with regulatory bodies was given over to a talk by H. H. Corey, Oregon Public Service Commission, on the relations of utilities to such bodies. Mr. Corey stressed the necessity of properly presenting to the public correct information on regulation. Responsibility for disseminating this information rests with both the utilities and the commissions, he said, though possible misconstruction by the public of the efforts of the commissions in such matters made it imperative that the utilities assume the larger portion of the responsibility.

Meter Committee

Recalling various experiences in polyphase metering that tended to produce errors in recording, L. D. Snow, of the Puget Sound Power & Light Company, Seattle, suggested ways of guarding against such errors. He told of circumstances leading to the policy of his company of metering 2-phase, 4-wire, and 3-phase installations with two single-phase meters, and urged the production of a cheaper 3-wire meter having two elements. He recommended the use of outdoor-type instrument transformers, thus elminating the necessity of using an instrument box on poles.

Discussion of the advisability of building up a short course for metermen, to be held at one of the universities of the Northwest, brought out a consensus of opinion against it. The metermen present favored any system of training for metermen that could be operated within a company organization over a long period of time.

Hydraulic Power Committee

To bring out operating experiences with high-head turbines, E. C. Hutchinson, president and general manager, Pelton Water Wheel Company, San Francisco, in a paper discussed operating results at Kern River No. 3 plant of the Southern California Edison Company and the Oak Grove plant of the Portland Electric Power Company. In the absence of Mr. Hutchinson the paper was read by E. D. Searing, advisory engineer, Portland Electric Power Company.

Irrigation and Power

Discussing the divergence of interests between power and irrigation uses of western streams, J. C. Stevens, consulting engineer, Portland, started from the premise that a stream could not be used completely for "the production of alfalfa and at the same time for kilowatt-hours." Realizing that the solution of the problem for each individual stream was one for local consideration primarily, he urged as a general policy that power interests give way to irrigation interests. Reasons for this were based principally upon the facts that every effort should be made to stimulate rural growth through reclamation of land; that there is not water enough to reclaim all the available land; and that there is no substitute for water for irrigation as there is for water as a source of power. Charts were shown to illustrate logical development of the irrigation and power possibilities of certain streams. For instance, if the entire flow of the Columbia River were to be used for irrigation of the Columbia Basin project the storage required would be 29 per cent of the annual flow of the river, and this would permit a power use of 55 per cent.

Discussing this paper, D. C. Henny, consulting engineer, Portland, supported Mr. Stevens' conclusions that irrigation was of paramount importance in the growth of the West by showing that in the past two decades the increase in irrigated acres has maintained a uniform relation to the increase in population.

Explaining the characteristics of solids traveling in water by solution and suspension, J. H. Siegfried, superintendent of power, Pacific Power & Light Company, Pasco, Wash., discussed various methods in use in the Northwest providing for the removal of silt from water before diversion into penstocks. He showed that it is necessary to balance investment costs plus operating expense of such silt removers against water-wheel maintenance cost for every installation on streams having a high silt content.

Proebstograph

D. W. Proebstel, superintendent of tests, Portland Electric Power Company, demonstrated the proebstograph. This is an instrument of his invention for determining the volume of excavation from tunnels. The device employs a pantograph principle by which cross-sections of the tunnel are plotted on a chart in the ratio of 1 to 24. It finds its principal use in determining the maximum and minimum rock-breakage clearances from the finished tunnel.

Accident Prevention

J. B. Fisken, consulting engineer, The Washington Water Power Company, discussed the economies of accident prevention. He showed that the cost of accidents included a number of intangible elements represented largely in lost time of crews; thus money spent preventing accidents represents expense saved. Discussion covered suggestions for accident cost-record keeping as an indicator of accident-prevention progress, and the public relations aspects of accident-prevention work.

A feature of the committee's program was an appealing address by Z. E. Merrill, assistant general manager, Mountain States Power Company, Albany, Ore., on the humanitarian aspect of safety work. This was made in presenting an Insul medal to K. P. Sims, a lineman of that company, for saving the life of a fellow employee, R. E. Russell, by the prone pressure method of resuscitation.

Apparatus Committee

A study of telephone interference arising from the grounded neutral on the 11-kv. network of the Portland Electric Power Company was presented by D. W. Proebstel. Experiments seem to point to the successful elimination of interference arising from grounded machine neutrals by the use of a "wave trap" comprising a reactance and capacitance in parallel.

Studies of insulating oil characteristics and of efficient and economic methods of recovering old oil were presented by W. A. Struthers of the Portland Electric Power Company. Discussion brought out the fact that the use of Fuller's earth with the percolation or agitation process is most effective in removing colloidal carbon, but is uneconomical when only small quantities of oil are to be treated. J. Hellenthal of the Puget Sound Power & Light Company called attention to the Diskelectro filter which he believed would prove economical.

Underground Systems Committee

Submarine cable laying in deep salt water was explained in detail by M. T. Crawford, superintendent of distribution, central district, Puget Sound Power & Light Company, with the aid of a moving picture showing the laying of the Olympic Peninsula cable, using the cableship U.S.S. Dellwood. In addition, the paper discussed construction of cables and concluded that rubber-insulated cable was preferable to paper-insulated, lead-sheath cable in salt water.

Careful preliminary forecasting of loads in congested districts was advocated in a paper on underground construction prepared jointly by J. M. Gillham, Portland Electric Power Company, and S. B. Clark, Northwestern Electric Company, superintendents of underground departments in their respective companies. In the same paper, manhole ventilation was discussed and charts were produced to show transformer temperatures under different ventilation systems.

J. S. Volpe, underground department, Portland Electric Power Company, presented a study of cable-sheath corrosion on certain cables after they had been installed only four years. Analysis showed the decomposed material to be white lead, and investigation showed it to be caused by decaying lumber refuse which formed a part of the filled ground through which the cables had been laid in temporary wooden troughs. Good ventilation and drainage of such installations were said to be necessary to forestall such corrosion.

Prime Movers Committee

A variety of subjects relating to the design and operation of hog-fuel-burning plants was touched upon in a paper by Tom Perry, superintendent of stations, Northwestern Electric Company. He discussed the handling of hog-fuel, describing the different equipment involved.

Economies of diesel-engine drive as compared with electric drive were discussed by R. S. Carroll, assistant engineer, Portland Electric Power Company. He gave results of a thorough analysis of power cost in a variety of loads, showing the cost of diesel power to be from 15 to 63 per cent higher than electric power.

H. S. Bastian, manager, Chas. C. Moore & Company, Engineers, Inc., Portland, discussed the relation of heat-balance methods to caustic embrittlement and corrosion in boilers. He recommended the evaporation system of make-up water treatment to prevent the entrance of embrittling chemicals and recommended oxygen removal by deaerating heaters in the line of the last heating stage to prevent corrosion checks.

Radio Co-ordination

Enumeration of a number of common causes of radio interference and methods of eliminating them were given by E. L. White, radio troubleman of the Puget Sound Power & Light Company. Indicating that although a great number of cases of trouble investigated were not caused by power lines he nevertheless urged a continuation of company policy of tracing radio troubles on the ground that the good will of the public and the "radio load" of battery chargers, battery eliminators, extra lights used, etc., were worth it.

Members of the Women's Committee, Northwest Electric Light & Power Association, who attended the Boise meeting of the committee in February, were: Mrs. A. W. Angell, Northwestern Electric Company, Portland; Mrs. A. E. Moyle, Utah Power & Light Company, Salt Lake; Mrs. Nell Laws, Puget Sound Power & Light Company, Seattle; Minnie C. Johnson, Deschutes Power & Light Company, Bend, Ore.; Mrs. Gertrude McDevitt, Idaho Power Company, Boise; Mary K. Walsh, The Washington Water Power Company, Spokane; Marguerite Butler, Portland Eelctric Power Company, Portland, chairman; Martha O. Goldapp, General Electric Company, Portland; Esther Miller, Gray's Harbor Railway & Light Company, Aberdeen, Wash.; Stella Dorgan, Mountain States Power Company, Albany, Ore.; and Ellen McCurdy, Pacific Power & Light Company, Walla Walla, Wash.

Variety of Activities Reported by Women's Committee

Reporting on a variety of activities among their own local committees, eleven members of the Women's Committee of the Public Relations Section met at Boise, Feb. 21, for the second meeting of the association year. Reports of those present and also of those not present, by proxy, indicated that all the women's committees of the member companies were undertaking worthwhile activities both within their own organizations and in connection with civic affairs in their communities. Marguerite Butler, Portland Electric Power Company, Portland, chairman, presided.

From company reports it was gleaned that a wide use had been made in local committee meetings of the skits furnished by the National Women's Committee. First aid and prone-pressure method of resuscitation also had a large place on the programs. Other subjects of meetings had been talks by department heads on the function of the department involved, and by manufacturers' representatives on various appliances.

Of the three committees appointed at the last meeting to study special subjects, Mary K. Walsh, The Washington Water Power Company, Spokane, chairman of the "Personnel Problem" group, reported that her committee had gathered reading material pertaining to women workers' problems to be distributed to members for study. Stella Dorgan, Mountain States Power Company, Albany, Ore., reporting on programs for smaller companies, stated that her committee was carrying on a correspondence on the subject and developing many useful ideas for making such programs interesting. For the group studying co-operation with women's clubs, Ellen McCurdy, Pacific Power & Light Company, Walla Walla, Wash., offered a number of suggestions produced by her committee covering ways for the company women's committees to aid in civic enterprises through such co-operation.

The meeting was addressed by W. R. Putnam, vice-president and general manager, Idaho Power Company, Boise, on company problems and ways in which the local women's committees could help solve them. A letter from Col. H. G. Winsor, personnel officer, Puget Sound Power & Light Company, Seattle, was read, in which he presented an excellent outline for the work of the general committee.

Convention Chairmen Appointed.—P. M. Parry, general chairman in charge of arrangements for the association's annual convention has appointed the following chairmen of convention committees: publicity—E. L. Bourne, of the Utah Power & Light Company; finance—R. H. Jones, Utah Power & Light Company; registration and information—George B. Thomas, Utah Power & Light Company; master of railroad transportation—A. D. Smith, Utah Power & Light Company; golf—B. E. Rowley, Edison Electric Appliance Company.

Meetings

Coming Events

California Electragists, Southern Division.—Convention at Hotel LeBec, Ridge Route, April 22-24.

Colorado Electrical Men. — State-wide meeting in Denver April 15, sponsored by Electrical League of Colorado.

Pacific Coast Electrical Association.—Advertising-Publicity Section.—Meeting in Los Angeles April 11. Symposium topic, "Supplementary Advertising." Annual Convention, Casa del Rey, Santa Cruz, Calif., June 14-18, 1927.

Engineering Section. Meeting in San Joaquin Light & Power Corporation's Building, Fresno, Calif., April 6-8, 1927.

National Electric Light Association—Annual Convention, Atlantic City, N. J., June 4-10, 1927.

Northwest Electric Light and Power Association.—Annual Convention, Salt Lake City, Utah, June 21-24, 1927.

Association of Electragists, International.—Annual convention at Hotel Chase, St. Louis, Mo., Aug. 8, 1927.

Utah Electrical League Sponsors Successful Joint Meeting

One of the most successful get-together meetings sponsored by the Electrical League of Utah was held at the Newhouse Hotel, in Salt Lake City, a short time ago. This was a joint meeting of the Electrical League of Utah, the Utah Society of Engineers and the Salt Lake chapter of the American Institute of Electrical Engineers, and was attended by about 400 members of the electrical industry and of various branches of the engineering profession. F. N. Nunn, president of the Telluride Power Company, and one of the pioneers in the development of hydroelectric power in Utah, Idaho and Colorado, was the principal speaker.

Prior to the general meeting Mr. Nunn was the guest at a dinner given in his honor, attended by about sixty prominent men representing the electrical and other branches of engineering. A number of these men were former associates of Mr. Nunn in his earlier activities in the Intermountain section. Mr. Nunn was presented with a copy of "The Story of Philosophy" by those assembled at the dinner, as a token of their esteem. The presentation speech was made by A. E. Buckler, of the Utah Power & Light Company.

The meeting which followed was presided over by R. M. Bleak, of the Utah Power & Light Company, and vice-president of the Electrical League of Utah. Mr. Nunn, the speaker of the evening, was introduced by Paul P. Ashworth, also of the Utah Power & Light Company. Mr. Nunn held the interest of his audience with reminiscences of some of the experiences encountered by his brother, the late L. L. Nunn, and himself in the early stages of hydroelectric development in the Intermountain region. He told of a few of the obstacles which had to be overcome in the building of power plants and lines, and by means of charts he illustrated some of the early-day apparatus and equipment used, with special reference to the property of the old Telluride company in western Colorado.

Musical entertainment features and refreshments concluded the program.

State-Wide Meeting in Colorado Is Set for April 15

April 15 has been set as the date of the state-wide meeting of electrical men sponsored by the Electrical League of Colorado. The meeting will be held in Denver, and a tentative program has been outlined by the special committee in charge. K. A. McIntyre, acting manager of the Society for Electrical Development, New York, has accepted an invitation to speak at the morning session, and the chief speaker in the afternoon will be a man of national reputation from the Pacific Coast, according to the league's announcement.

It is expected that the attendance this year will exceed that of last year when 224 were registered.

Annual Election of San Diego Electric Club.—At the annual election held by the Electric Club of San Diego the following officers were elected: president—Charles Stevens, manager, Pacific Telephone & Telegraph Company; first vice-president—W. Gibson, contractor; second vice-president—D. J. Kelly, San Diego Consolidated Gas & Electric Company; secretary and treasurer—W. deWaard, of the same company. The directors include, in addition to the officers named, R. C. Cavell and E. Sherwin of the San Diego Consolidated Gas & Electric Company; Ralph Chace, Westinghouse Electric & Manufacturing Company; H. B. May, General Electric Company; and Fred Goss, Electrical Supplies & Distributing Company.

Annual Ladies' Night.—Turkey dinner, an entertaining program and dancing were features of the annual ladies' night at the Sacramento Valley Electrical Society, March 9.

Western Red Cedar Association Holds Membership Meeting

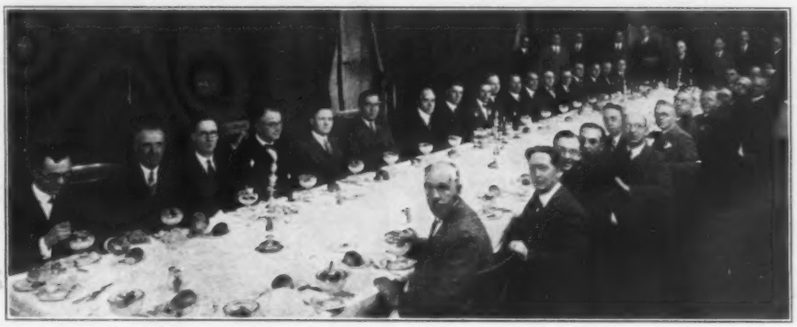
Research and trade extension will be a principal function of the Western Red Cedar Association in 1927, it was decided at a recent membership meeting held in Spokane, Wash., while national advertising of cedar poles will not be continued for the current season. Increased sales in 1927 over the past busy year were predicted by F. S. Fulwiler, secretary-treasurer. Better organization which now is being attained between pole shippers and the carriers will result in more prompt deliveries, he predicted. The association is supporting proposed legislation before the Interstate Commerce Commission which would permit low, multiple-carload rates on poles.

J. E. Seaman, Western manager of the Page & Hill Company, Spokane and Minneapolis, was elected president.

Lighting Conference at Edison Lighting Institute.—Illumination design was featured at the recent lighting conference held at the Edison Lighting Institute of the Edison Lamp Works of the General Electric Company. The attendance list of 67 included, in addition to one representative from Strasburg, France, men from central stations in all parts of the Eastern states. This conference was planned and carried out especially for the benefit of central station lighting specialists and was, as a consequence, most successful, it being possible to concentrate on general form of activity.

Oakland Electric Club Has Musical Meeting.—"Music for rich men, poor men, beggar men, electricians," in the words of the announcement, formed the basis of the Oakland Electric Club's program for its March 14 meeting. George Lloyd Taylor of Sherman, Clay & Company, was the speaker.

Federated Radio Trades Association to Hold Meeting.—The next meeting of the Federated Radio Trades Association is to be held at the Stevens Hotel, Chicago, during the week of June 13, in conjunction with the Radio Manufacturers Association and the Radio Trade Show.



These men gathered at a dinner in the Newhouse Hotel, Salt Lake City, to honor P. N. Nunn, president of the Telluride Power Company, and a pioneer in hydroelectric development in Utah, Idaho and Colorado.

Contractors, Dealers and Inspectors

Clyde Chamblin Named President of Electragists International

Clyde L. Chamblin of San Francisco and Oakland, president of the California Electragists, prominent electrical contractor, has been elected president of the Association of Electragists, International, according to wire messages from Laurence Davis, secretary of the A.E.I. He will succeed Joseph A. Fowler, of Memphis, Tenn., who visited California last year to address the annual convention of the California Electragists at the time that Mr. Chamblin was made president of the California organization for the second time.

CLYDE CHAMBLIN
New president of the A.E.I. as well as president of the California Electragists.

Clyde Chamblin recently attended an N.E.L.A. industrial conference in Chicago, at which he represented the Electragists. Following that he proceeded to New York to attend a meeting of the board of directors of the Society for Electrical Development and a meeting of the executive committee of the Association of Electragists, International, at which he was named president of the association, in addition to his being president of the California association.

Mr. Chamblin has been identified with the electrical industry for a number of years, many times representing the electrical contractors and dealers in other electrical associations and organizations. He is president of the California Electrical Construction Company, San Francisco. In 1925-1926 he represented the Electragists as a member at large on the executive committee of the National Electric Light Association. Other important posts that he has held include that of member of the executive committee of the Association of Electragists, director of the Society for Electrical Development, Inc., president of the California Association of Electrical Contractors and Dealers, president of the San Francisco Association of Electrical Contractors and Dealers and member of its executive committee, president of the San Francisco Electrical Development League, member of the executive committee of the Pacific Coast Electrical Association, director of the Radio Trades Association and member of the advisory committee of the California Electrical Bureau.

All California electrical contractors will be glad to know of this new honor conferred upon the leader of their own organization, a man who has been active and enthusiastic in the organization work and advancement of the electrical contractors and dealers of his state.

Fixture Company Opens New Long Beach Branch

The Empire Lighting Fixture Company, Inc., has opened a local branch at 1095-97 American Avenue, Long Beach, Calif., in the new Dilday Building, where it has leased both ground floor and second floor space. On the opening night, Feb. 12, several thousand people visited the store, at which time $200 worth of specially designed bridge lamps were given away. Entertainment was furnished by a Hawaiian orchestra and novelty performers.

At the Long Beach store the company has a ground floor space of 20 x 40 ft., and the entire upper floor of the building, which is 50 x 50 ft. It also has stores at Los Angeles, San Diego, Glendale and Hollywood. Present at the opening were J. Thornquist, local manager, John F. Mortenson, president, and G. W. Thompson, secretary of the company.

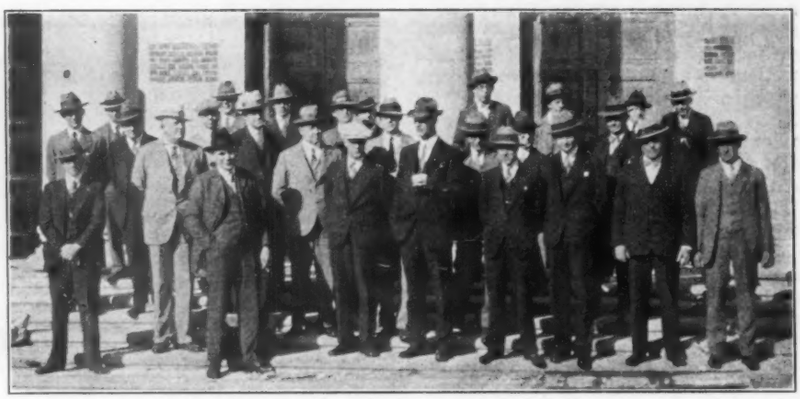
The Bay Cities Electric, for several years located at 1512 Third Street, Santa Monica, Calif., has moved into its new store at 218 Broadway.

Plan International Association of Electrical Inspectors

At a preliminary organization meeting held recently in New York the first step was taken to outline a proposed method whereby an International Association of Electrical Inspectors could be formed to include the United States and Canada. The object of the association would be to unify the efforts of state, municipal and underwriting inspectors concerned with interior wiring to bring about the adoption and administration of standard methods. The membership that would be affected by such an association would be over one thousand who are active in inspection work and about one thousand associate and other members.

The temporary organization formed consisted of J. C. Forsyth, president of the Eastern Association of Electrical Inspectors, president, and F. D. Weber, secretary of the Northwest Association of Electrical Inspectors, Portland, Ore., secretary. The other members present at the meeting were: T. H. Day, past-president of the Eastern Association of Electrical Inspectors; C. W. Mitchell, secretary of the California Association of Electrical Inspectors; S. S. Hertz, a member of the board of directors of the Eastern Association of Electrical Inspectors; A. G. Hall, a member of the executive committee of the Western Association of Electrical Inspectors and chief inspector of the Hydro-Electric Commission of Canada; John W. Kelly, Jr., Camden, N. J., affiliated with the International Association of Municipal Electrical Inspectors; J. S. Mahan, Chicago, member of the executive committee, and William S. Boyd, Chicago, secretary of the Western Association of Electrical Inspectors; K. W. Adkins. Missouri Inspection Bureau, St. Louis; W. J. Canada, field secretary National Fire Protection Association; Victor H. Tousley, Chicago, affiliated with the Western Association of Electrical Inspectors; William P. Briggs, New Bedford, Mass., a member of the executive committee of the Western Association of Electrical Inspectors, and E. W.

Electragists on Tour at Sacramento Auditorium



One of the features of the Sacramento excursion of California Electragists, Northern Division, was a tour of the new Memorial Auditorium.

Benz, West New York, N. J., secretary of the International Association of Municipal Electrical Inspectors.

Secretary Weber and Victor Tousley were appointed to draft a tentative constitution which will be sent to each representative in the temporary organization formed in order that he may present it to his individual associations, which will pass upon the formation of an international association and the adoption of a constitution.

D. W. Davis, of the **Electric Bulb & Appliance Company,** 853 E. Washington Street, Pasadena, Calif., has consolidated with **W. A. Yeisley** of the **Radio Service Station.** They have divided the store at this address into electrical and radio departments.

H. B. Sanders, electrical contractor-dealer for many years located at 60 W. Colorado Street, Pasadena, Calif., has moved into a new store at 1765 E. Colorado Street to keep up with the growth of the city in that direction. Mr. Sanders specializes in merchandising of appliances and fixtures.

The Franco Electric Company recently celebrated the opening of its new store in Sherman, Calif., at 8941 Santa Monica Boulevard. It was located formerly at 798 Hildale Avenue.

The Rudling Electric Construction Company, formerly located at 3154 Glendale Avenue, Los Angeles, has moved to 18653 Calvert Street, Reseda, Calif.

Joe M. Carlson, of the **Central Electric Company,** returned recently from an extended tour of Europe and Asia Minor. He recounted many of his travel experiences in England, France, Sweden, Denmark, Germany, Egypt and Palestine, including an air trip from Denmark to Germany, to the San Francisco Electrical Contractors Association, recently.

Intrepreneur

Maynard Canon played host and chairman on behalf of the Sacramento contractors at the Electragist annual excursion meeting.

Northwest Inspectors Select Seattle for Next Year

At a meeting of the executive committee of the Northwest Association of Electrical Inspectors held at Portland, March 10, 1927, it was decided to hold next year's convention in Seattle, Jan. 24-26, 1928. This convention will be sponsored by the Electric Club of Seattle, which was represented at the meeting by S. G. Hepler, proprietor of the Arrow Electric Company of that city.

The manufacturers' exhibits, featured for the first time by the inspectors' association at the January, 1927, convention in Portland, will be continued next year and thrown open on Jan. 23, a day prior to the start of the convention, so as to give time for closer inspection by interested persons. The exhibit will be open to the public on this day.

Convention Report Next Issue

Full reports of the Fourth Annual Meeting of the California Association of Electrical Inspectors held March 24, 25 and 26 at Hotel Leamington, Oakland, Calif., will be published in these columns in the May issue of Electrical West. The forms for the April issue had already gone to press before the starting of the convention. It was expected that a large attendance would be registered for the convention. A number of very good papers presented by leaders of the industry were to be heard. According to Ben C. Hill, president of the association, all plans have been perfected to make it one of the record breaking conventions of electrical inspectors.

For full details see the next issue of this magazine.

BULLETIN

Convention of California Electragists, Southern Division—Hotel LeBec, Ridge Route. . . . . April 22, 23, 24

Arrange Meeting of Municipal Electricians in Salt Lake

Officials of the Intermountain Association of Municipal Electricians were in Salt Lake City recently to arrange for the annual convention of the association to be held in Salt Lake City next August.

President D. R. Snyder of Augusta, Ga.; David Reed, of Denver, chairman of the executive board, and Dan Morgan, of Wilkesbarre, Pa., met with Charles Reading, city electrician of Salt Lake City, in charge of local arrangements.

One of the features of the convention, which will be attended by more than 250 delegates, will be a $50,000 exhibit of traffic signals, fire alarm equipment and street lighting. This will be under the supervision of Mr. Morgan.

Ne Page-McKenny Company, Seattle, recently received a contract for installing underground vaults and manholes, ducts and conduits on various downtown streets, on a bid of $53,232.61.

"The Good Old Days"

Art Rowe (right) telling the boys, Ackerman, Charlie Tilly and Lloyd Flatland, "I remember when—"

L. A. Barley, engineer of the Mountain States Inspection Bureau, **John Malpiede,** city electrician of Denver, and **David Reed,** superintendent of fire and police telegraph of Denver, were guests of honor at the Electrical League of Colorado meeting in February, giving a report of the convention of the Western Association of Electrical Inspectors held recently in Kansas City.

The Holland Electric Shop, formerly at 5715 Pasadena Avenue, Los Angeles, has moved to a new store at 5632 Pasadena Avenue, where greater space is given to fixture display and radio booths.

John A. Wilferth, dealer in electromedical equipment, radio and electrical appliances, has moved from his old location on Olive Street, to 729-A Ninth Street, Los Angeles.

Sam Fingerhut and **W. T. Drury,** electragists of Bakersfield, have combined forces and incorporated under the name of **Drury-Fingerhut, Inc., Electragists.** Sam Fingerhut formerly conducted the **Acme Electric Company** while Tom Drury operated under the name of **W. T. Drury, Electragist.**

The Draeger-Minkel Company, 718 Octavia Street, is to be the new name under which **George Draeger** and **Fred Minkel, Jr.,** electrical contractors of San Francisco, are to be known. These two contractors consolidated in February.

J. C. Caine, deputy electrical inspector, Portland, journeyed to Kansas City in January to attend the meeting of the **Western Section of the International Association of Electrical Inspectors.** He addressed the convention on the operation of the dealers' license provision of the Portland code and the elimination of sub-standard materials and appliances.

Books & Bulletins

INTRODUCTORY ELECTRODYNAMICS FOR ENGINEERS.

By Edward Bennett, E.E., professor of electrical engineering, University of Wisconsin, and Harold Marion Crothers, Ph.D., dean of engineering, South Dakota State College. First edition, 1926, 665 pages, 306 illustrations, cloth bound, 5½ x 8¼ in., 9 appendices. McGraw-Hill Book Co., Inc., New York. $3.50.

In the opinion of the authors, the prevailing educational practice of placing all engineering students, regardless of interest and aptitude, in the same classes in the important introductory work in the mathematical and physical science of the first two years of college is a grave educational blunder. The authors believe that there are three methods of treatment of material used for study purposes. The first of these they classify as "profoundly technical treatment," the second as "moderately technical treatment," and the third as "non-technical treatment." In their opinion the first of these is adapted to the needs of men with superior aptitude and keen interest in the subject; the second is adapted to the needs of men with a moderate aptitude and moderate interest in the subject, and the third is adapted to the needs of men who have either little aptitude for or a non-professional interest in the subject.

With these concepts in mind the authors have prepared this text with the view of using it as an introduction to the electrical theories and principles which are fundamental to design, development, research and technical supervision in the electrical field, and one which should be given to engineering students belonging to the first group above mentioned. The text as presented has been used in mimeographed form during the past seven years at the University of Wisconsin as the basis of the introductory course in electrical engineering. The course is designed to start in the middle of the second year at such time as the student has completed the first semester of calculus and is entering upon the second. One of the chief aims in starting this course at that particular time is to offer the engineering student ample opportunity for the practical application of his calculus.

Several novel and simplified ideas have been carried out by the authors, and this book should serve well not only as a text as originally designed by the authors but as an interesting and valuable reference. G.R.H.

Intake Flow for High-Velocity Flumes.—Bulletin of the University of Washington Experiment Station prepared by C. W. Harris, professor of hydraulic engineering, and J. B. Hamilton, instructor in civil engineering. This is a well illustrated little booklet giving some information that should be extremely valuable to those interested in design, construction or operation of flumes for irrigating or other purposes. It gives the results of numerous experiments made with different types of intakes and gives detailed information and dimensions for those intakes that have proved highly efficient. This publication is known as Bulletin No. 33 and may be obtained from the Director of the Engineering Experiment Station of the University of Washington at Seattle at 25 cents a copy.

TELEPHONE COMMUNICATION SYSTEMS

By Royce Gerald Kloeffler, professor in electrical engineering, Kansas State Agricultural College. First edition, 6 x 9, cloth bound, 284 pages, 213 figures. The MacMillan Company. Price $4.

This book, intended for use as a text in a short college course in telephony, covers the subject in a concise, clear, and readable manner. According to the author, the text has been prepared to give electrical engineering students a general insight into and knowledge of the telephone art whether they follow it up as a life work or use it as a means of appreciating communication problems which later might be allied with some other branch of electrical engineering.

Throughout the book only typical circuits and pieces of apparatus are considered so as to bring out the fundamentals of the art and in the interests of brevity long descriptions of the historical development of the industry and explanations of obsolete equipment have been eliminated.

While from the standpoint of the telephone engineer it might have been desirable had certain portions of the book gone into greater detail, yet for the purpose intended the book should serve admirably. Not only the college student but the practicing electrical engineer as well will find it of value in a general study of the subject.

E.R.S.

C.R.E.A. REPORTS ON ELECTRICITY IN OREGON AGRICULTURE

In a 48-page booklet the Oregon Committee on the Relation of Electricity to Agriculture has published its 1926 annual report. After briefly stating the purpose of the committee and its first year's work the bulk of the report is given over to progress made during 1925-26. The report gives only a brief summary of the work on the various investigations undertaken. More detailed reports will follow completion of the projects. Much detailed information is given and there are many tables and illustrations.

The results of irrigation studies form an important part of the report. Another major portion of the booklet is devoted to reporting on the use of electricity in poultry farming. In the field of horticulture the principal investigational work was on the study of dehydration; and this work is as yet incomplete. A report on the costs of grading apples electrically was also a part of the horticulture section.

The following general farm uses are also reported on: Feed grinding, hay hoisting, elevating grain and shavings by blower, cutting ensilage, shearing sheep, and pumping water by automatic, electrically-driven pumps.

The third section of the book is given over to a general discussion of farm electrification in the state, with charts showing the farming districts, the classification of lands as to the kind of crops for which they are suitable, the density of farm population, and the location of transmission lines.

ARC WELDING

Published by the Lincoln Electric Company, Cleveland, Ohio. 6 x 9; 160 pages; 236 illustrations; bound in imitation leather. Price, $1.50.

This book is devoted largely to the use of arc welding in general production manufacturing and points out that there are two main fields for production welding. The first and perhaps the best known is the use of arc welding in place of riveting. It is demonstrated in this book that a welded joint can be 100 per cent efficient whereas the strength of a single riveted joint never can equal the strength of the members joined.

The second main field for arc welding is the substitution of arc welded steel for cast iron. This book makes the claim that 90 per cent of the iron castings now used could be replaced by arc welded steel at a decided saving. There is a complete discussion of how to go about redesigning cast iron for manufacture in steel, and the illustrations show clearly where this is being done commercially by representative manufacturers.

Reports on Industrial Heating Issued by N.E.L.A.—Ten serial reports covering various phases of industrial electric heating have been issued by the power committee of the Commercial Section, N.E.L.A. The following subjects are covered in the reports:

Application of Electric Heat to the Baking of Enamel or Japan.
Annealing Iron and Steel in the Electric Furnace.
Baking Armatures and Electric Coils in the Electric Oven.
Core Baking with Electric Heat.
Melting Brass in the Electric Furnace.
Application of Electric Heat to Type-casting Machines.
Electro-sherardizing.
Melting Steel and Gray Iron in the Electric Furnace.
Annealing Aluminum in the Electric Furnace.
Heating Glue Electrically.

The Wind Balance in the Boeing Aerodynamical Laboratory at the University of Washington.—By Frederick Burt Farquharson, instructor in general engineering, University of Washington. This is an exposition of the apparatus developed and of the test data obtained through the use of that apparatus. This 23-page pamphlet presents information that should be of value to those interested in wind tunnel investigation. The publication is known as Bulletin No. 38 and is obtainable through the Director of the Engineering Experiment Station, University of Washington, Seattle, Wash. Price not quoted.

SWITCHGEAR FOR ELECTRIC POWER CONTROL

By E. B. Wedmore, M.I.E.E., F. Inst. P., M.A.I.E.E.; and Henry Trencham, Assoc. M. Inst., C.E., M.A.I.E.E. 5½ x 8¼ in., cloth bound. Published by Oxford University Press, American Branch, New York.

This interesting and instructive book is an account of English practice in what is becoming to be one of the most important phases of electric power system operation; that is, the application of apparatus to control the large amount of power generated and distributed by modern power plants. Not only is the subject of control of energy treated, but the text goes into the various protective devices used to isolate all the sections of a distribution system from the remaining portion of a system. The subject is treated from a standpoint both of the designer and of the user of electric control apparatus.

From the standpoint of the practicing electrical engineer engaged in central station work the book should be quite valuable. The only criticism which might be offered would be that the value of the book could have been somewhat increased had certain features been treated somewhat more in detail. The subject is such a broad one, however, that it would hardly have been possible to have gone into it with much greater detail and kept the size of the book within reasonable bounds. From the standpoint of the electrical engineering student this text should also prove quite valuable as a source of supplementary reading. —E.R.S.

MAGNETISM AND ATOMIC STRUCTURES

By Edmund C. Stoner, Ph.D., lecturer in physics at the University of Leeds. 5¾ x 8½ in., cloth bound, 371 pages, 56 illustrations, 44 tables. E. P. Dutton and Company, New York, publishers. 1926. Price $5.

Important researches and theories of magnetism interpreted as an atomic phenomenon, many of which have been available only in research papers in scientific journals, are here assembled under one cover. The book is written primarily for physicists and presupposes a knowledge of modern physics. It is intended to supplement ordinary works on magnetism and passes over or treats only briefly the subjects usually covered at length in them.

Theories of classical electro-magnetic theory are assembled in 20 pages, using the notation of vector analysis. However, this notation is used only infrequently in the body of the book so that a lack of knowledge of it will not be a serious handicap to the reader. The interpretation of magnetism as an atomic phenomenon is treated at length and the Quantum Theory is applied to it. Methods and results of much experimental work, such as that of Onnes at low temperatures and of Gerlach and Stern are described.

The literary style and sentence construction are so simple and direct that the book is a delight to read. Topics hitherto presented in an abstruse way are stripped of their complexities and yet are so completely stated that the informed reader sees the whole in a complete perspective, and the uninformed reader gains the important facts and an unbiased judgment of the present status of the problem.

Another feature of great value lies in the fact that each chapter is largely complete in itself and thus the book may be used to good advantage for reference purposes. —A.W.N.

ELECTRIC CIRCUIT THEORY AND THE OPERATIONAL CALCULUS

By John R. Carson, American Tel & Tel. Co., 197 pages, 32 illustrations, 6 x 9, cloth bound. First edition, 1926. McGraw-Hill Book Company, Inc., New York. Price $3.

This work is far more than merely an exposition of Heaviside's operational calculus. Heaviside's own work was largely intuitive and experimental. Mr. Carson has cleared away obscurities that have hindered a broad and clear understanding of Heaviside's work. All of the Heaviside rules are rigorously deduced from one integral equation, thus supplying the theoretical foundation, the lack of which proved a stumbling block to Heaviside's own readers. Moreover, to clarify his own exposition, Mr. Carson has included numerous problems, in the working of which the methods of the operational calculus are made singularly clear.

The first chapter of his book briefly explains the fundamental physical principles of electric circuits and the way in which mathematical equations may be formulated by the solution of which the characteristics of such circuits may be predetermined. The next two chapters attack the problem of determining the response of an electrical network to a unit electromotive force applied when the network is in equilibrium. Chapter IV develops the operational theorems from the basic integral equation. The next chapter demonstrates the simplicity and directness of the Heaviside rules in connection with the asymptotic solution of operational equations as divergent series. The problems of the propagation of current and voltage in the non-inductive cable, in the transmission line, and in artificial lines and wave filters are considered next as practical examples of the use of the operational calculus. The last three chapters consider successively (1) the transmission line with terminal impedances, (2) circuits in which either the resistance or the inductance is changing, and (3) the application of the Fourier integral to electric circuit theory. The book also contains a valuable bibliography. The book is a valuable contribution both to engineering and to mathematical literature. —L.E.R.

DIE WALKURE— A CLASSIC FEAT OF BROADCASTING

By C. L. Huyck, Graybar Electric Company, San Francisco. Published by Graybar Electric Company, 1926.

This interesting booklet commemorates the broadcasting of Wagner's "Die Walkure'" from the Shrine Auditorium, Los Angeles, only 56 years after its initial presentation in Munich, Bavaria.

After a brief discussion of the opera, setting and orchestration the booklet describes the technique involved. "Five microphones were placed in strategic positions about the stage and orchestra pit and by means of an intricate control mechanism they were called into play just as an orchestral conductor summoned the various pieces of his orchestra. A 500-mile telephone circuit transmitted the opera from KFI in Los Angeles to KPO in San Francisco." Ten microphone and repeater men from the Southern California Telephone Company and The Pacific Telephone & Telegraph Company played an important part in the broadcasting.

The book is an excellent example of good typography and there are numerous illustrations, including views of the Shrine Auditorium in Los Angeles, the Civic Auditorium in San Francisco, and stations KPO and KFI.

MacRAE'S AND HENDRICKS

A consolidation of MacRae's Blue Book and Hendricks Commercial Register. Vol. XVII, 1926. 2,226 pages, 9 x 12 in., cloth bound. Published by MacRae's Blue Book Company, 18 E. Huron St., Chicago, Ill.

This consolidation combines the most desirable features of both of these commercial guides. The sections are: Advertisers' Index, giving address and local distributors; Index to Classifications; Classified Materials; and Trade Names. This arrangement makes it of invaluable assistance to the buyer or specifier of material who desires to keep in touch with competitive sources of supply. The careful indexing and cross-indexing make this especially valuable where only incomplete information is available as to a product, manufacturer or trade name.

The advertisers' index with the addresses and local distributors' listing brings to the possessor of this Blue Book a complete listing of representatives. Similarly those seeking information and having reference only to a type of material or to a trade name also will find it simple to trace the desired information to the source. The complete index to the various classifications is helpful and acts as a guide to the use of the book itself.

This is truly a valuable reference work and is something every commercial house could use to advantage. —W.A.C.

TRANSMISSION LINE THEORY AND SOME RELATED TOPICS.

By W. S. Franklin and F. E. Terman. First edition. Published by Franklin & Charles, Lancaster, Pa. 1926. 312 pages, 6 x 9 in., cloth bound.

This volume is an advanced engineering text on wave motion, wave-form analysis and related subjects. The material is grouped in three parts.

Part I is concerned chiefly with the development of mathematic equations to represent wave travel and reflection in transmission circuits, as applied to non-periodic, harmonic and steady-state wave trains. Problems, answers and "clock" diagrams are included to illustrate and simplify the application of the mathematical treatment. An improved form of 3-phase line calculation by the solution of complex quantities is illustrated effectively by the development of circle diagrams. A concluding chapter discusses in detail the structure of artificial lines and wave filters, a subject which at the present time is particularly applicable to the radio and telephone arts.

Part II is a comprehensive review of the use of Fourier's series in wave-form analysis and also includes a description of one of the more common types of mechanical harmonic wave-form analyzers.

Part III comprises a restatement in simple terms of numerous axiomatic problems in line capacity and inductance together with the fundamental methods of circuit analysis by complex quantities and hyperbolic functions. Their appearance in a single volume is particularly convenient for ready reference. —R.H.T.

ROTARY AND MOTOR CONVERTERS

By Ernest F. Smith. 233 pages, cloth bound, 57 illustrations, 5 x 7 in. 1926. Published by Crosby Lockwood & Son, London. Price 7/6.

This publication is designed as a handbook for operators and attendants of substations or other power plants where there is rotary electrical equipment. The book conveys the technical information involved and in a manner that should be understandable to the average station operator or other practical electrical men, and should prove useful.

The text is divided into fifteen different chapters and carries the reader through a brief discussion of electrical theory and its application to the electrical machine in general and on through the d.c. and a.c. machines and rotary converters. An introduction also is given regarding the construction and application of vector diagrams. —G.R.H.

GASOLINE AUTOMOBILES

By J. A. Moyer, Director, University Extension, Massachusetts Department of Education. Second edition, 1926. 5¼ x 7¾ in., cloth bound, 352 pages, 215 illustrations. Published by McGraw-Hill Book Company, Inc., New York. Price $2.50.

A recitation of elementary facts relative to the automotive industry is presented in this book, profusely illustrated. Modern developments are noted and the material is presented in a simple, straight-forward manner. The book should be adaptable to schools specializing in short courses in vocational training.

TWENTY-ONE ADVENTUROUS NIGHTS IN THE REALM OF MUSIC.—This very attractive booklet covers a series of programs arranged for broadcasting during the Edison Hour by the New York Edison Company over radio station WRNY. The prologue tells again the old story of the Arabian Nights entertainment and gives the following plan of the series of 21 musical programs: "Each week the narrator will create the situation. He will depict it briefly, tersely, picturesquely, romanticly. He will ask you to shut out the rest of the world, to forget all other moods, to remove all other pictures and to concentrate upon the story that he is telling. Then the musicians will begin and their music will seek to vitalize the idea, and thus an hour of music will crystalize a mood; an emotion; a picture."

Personals

Prof. E. D. Merrill, dean of the College of Agriculture, University of California, has been appointed chairman of the California Committee on the Relation of Electricity to Agriculture to succeed Prof. L. J. Fletcher. Prof. Merrill, who was born in East Auburn, Me., in 1876, holds the degrees of bachelor of science and master of science from the University of Maine. After his graduation in 1898 he spent a year as assistant in natural science at that university and then became assistant agrostologist in the U.S. Department of Agriculture, Washington. In 1902 he was appointed botanist for the Bureau of Agriculture, Manila, then

PROF. E. D. MERRILL

consecutively held that position with the Bureaus of Agriculture and Forestry, the Bureau of Governmental Laboratories and the Bureau of Science. From 1912 to 1916 he was associate professor of botany in the University of the Philippines, and professor and head of the department from 1916 to 1919. He then became director of the Bureau of Science in Manila, holding that position until 1923 when he took up his present work with the University of California. Professor Merrill's experience as director of the Philippine Bureau of Science gives him a wide knowledge of many fields aside from his own particular one of botany, for in that bureau is centralized practically all of the scientific work of the Philippine government. The field covered includes the biological sciences, botany, ornithology, zoology, icthyology, plant pathology and physiology, entomology, chemistry, standardization of weights and measures, geology and mining, medical biology, public health laboratory work, and the manufacture of all standard types of vaccines and serums for a population of about 11,000,000. Professor Merrill, who has written numerous books on botanical subjects, is a member of the American Academy of Arts and Sciences, the Botanical Society of America, and many other scientific organizations.

W. J. Crabbe, who at different times has served as district superintendent for the Southern Sierras Power Company, the Sierra & San Francisco Power Company and the Pacific Gas and Electric Company, respectively, has been made district manager of the Monterey district of the Coast Valleys Gas & Electric Company, Salinas, Calif.

H. A. Rands, formerly construction engineer for the Portland Electric Power Company and more recently connected with The Washington Water Power Company's Lake Chelan project, is in charge of preliminary engineering on a power project on Campbell River in British Columbia for the Crown Willamette Paper Company to supply power for a large paper mill to be located on tidewater in that vicinity. **B. C. Condit,** formerly engineer for the Northwestern Electric Company, Portland, is consulting engineer for the project.

R. M. Kerschner, formerly manager of Hubbard & Company, Emeryville Station, Oakland, Calif., has been transferred to the Pittsburgh offices of that concern.

A. J. Gaisell has been appointed local agent at Rochester, Wash., for the Puget Sound Power & Light Company, which recently took over the Peoples Utility Company there.

George Goddard, formerly manager of the electrical department for the Seattle Hardware Company, Seattle, is now with Spelger & Hurlbut, as general buyer.

C. B. Hawley, manager of the Inter-Mountain Electric Company, Salt Lake City, recently returned from attending a meeting of the executive committee of the Electrical Supply Jobbers Association in New York City.

A. H. Goss, president, Electric Refrigeration Corporation, Detroit, has been invited to act as one of the American representatives at the Fifth International Congress of Refrigeration at Rome, Italy, in September, 1927.

Henry E. Dewey, foreman of overhead construction for the Los Angeles Gas & Electric Corporation, on March 1 retired from active service of more than twenty-nine years with that company.

Ernest G. Heinrich, formerly sole owner of the Baker Light & Power Company, Baker, Mont., is in Sacramento, Calif., visiting the Pacific Coast with the intention of engaging in business for himself. Mr. Heinrich built the Baker plant in 1914 and in 1925 sold it to the Midwest Public Service Company of Casper, Wyo., which after a year sold it to the Mountain States Power Company.

George H. Clifford, since June, 1925, district manager of the Southwestern division, Stone & Webster, Inc., with headquarters in Houston, Texas, has been made division manager in charge of all operations in that company's Southwestern district and the Virginia properties, with headquarters in Boston.

J. L. White, recently promoted to be merchandise sales manager, Portland Electric Power Company, Portland, a newly created position in the commercial department of that company, was born in Arnprior, Ontario, Canada, in 1884. After completing high school in that city, he went to the Canadian General Electric Company factory at Peterboro, Ontario, and later entered

J. L. WHITE

the public utility business with the Sault Sainte Marie Light & Power Company, Sault Sainte Marie, Ontario. In 1905 he moved to Seattle with the National Board of Fire Underwriters, as electrical inspector, and two years later went to Portland where he joined the commercial department of the Portland Railway, Light & Power Company, as it was then known. In August, 1910, he left the Portland company to join the H. M. Byllesby organization as local manager at Dallas, Ore., for the Oregon Power Company, the predecessor of the Mountain States Power Company, remaining with that company eight years. During the last two-year period, from 1916 to 1918, he was in charge of all the Willamette Valley properties of the company, as district manager at Albany, Ore. In May, 1918, he resigned to go into private business in Seattle, and in April, 1919, he returned to Portland with the Industrial Finance Corporation of New York. In 1922 he again entered the employ of the Portland Railway, Light & Power Company, and was placed in charge of the electric store at Portland, where he has remained until his recent promotion.

James R. Kearney, president James R. Kearney Corporation, St. Louis, recently visited San Francisco. On his return to the factory he stopped at Portland, Seattle and Salt Lake City.

Mark Smith, formerly connected with Elmer Cunningham, Inc., San Francisco, has gone to Los Angeles to become associated with the Atwater-Kent interests in that city.

W. W. Miller, assistant manager of the industrial department, General Electric Company, Schenectady, N. Y., spent some time in San Francisco not long ago during a tour of the Pacific Coast. Mr. Miller is assistant to **E. O. Shreve,** formerly San Francisco district manager for the General Electric Company.

A. H. Nicoll, sales manager for the Graybar Electric Company, San Francisco, has been elected president of the San Francisco Electrical Development League and recently was installed in that office. Mr. Nicoll has been connected with the electrical industry for the past nineteen years and for all of that time, with the exception of two years, he has been a member of the or-

A. H. NICOLL

ganization of the Western Electric Company or Graybar Electric Company as it is now known. He began his career in 1908 selling lamps for M. A. Bryte of San Francisco, and the following year he became sales record clerk for the Western Electric Company. Three years later he resigned to become appliance sales supervisor for the Utah Power & Light Company in Salt Lake City. The year 1913 found him as city salesman for the Western Electric Company in that city. He held that position for three years, at the end of that time being appointed office specialist in charge of office sales. Then in 1920 he was transferred to San Francisco as a telephone specialist. After ten months in this position he was made specialty sales manager in charge of appliance sales, continuing in that position until Oct. 1, 1925, when he was made sales manager. Mr. Nicoll always has taken an active part in the affairs of the league of which he now is the head and has served it in various capacities, among them that of director. He is also prominent in the activities of the Pacific Coast Electrical Association and at the present time is a member of the executive committee of the Commercial Section.

W. Chester Morse has been appointed city engineer of Seattle, Wash. Mr. Morse, who was a member of the engineering firm of Lewis, Wiley & Morse from 1908 to 1917, at one time served as one of a commission of engineers that made a survey and recommended construction of a dam in Diablo Canyon as part of the Skagit hydroelectric development.

Luke C. Bradley, division manager of the Southwestern Division of Stone & Webster properties, which includes the El Paso Electric Company, has been elected president of the Rhode Island Public Service Company.

D. V. Thomas, for the past two years and a half assistant to the general superintendent of railways for the El Paso Electric Company, El Paso, Texas, has been transferred to the Houston Electric Company, Houston.

E. D. Kilburn, vice-president and general sales manager, Westinghouse Electric & Manufacturing Company, recently made a tour of the Pacific Coast, stopping for a short time in Los Angeles, San Francisco, Portland and Seattle.

E. G. Holding, electrician of Salt Lake City, has been spending some time in California.

Lewis A. McArthur, vice-president and general manager, Pacific Power & Light Company, Portland, talked recently before the Allied Outdoor Clubs of Oregon on governmental map-making.

Harvey Hubbell, president, Harvey Hubbell, Inc., Bridgeport, Conn., in company with a number of other prominent Eastern business men was in San Francisco a short time ago during a tour of the Pacific Coast.

Ralph Hunner, manager of the L. D. McFarland Company, Ltd., branch at East Milwaukie, Ore., recently visited San Francisco and Los Angeles.

W. F. Harvey, president Porcelain Insulator Company, Lima, N. Y., recently visited San Francisco during a trip throughout the West Coast territory.

W. H. Ude, director of public relations of the Washington Water Power Company, Spokane, was general campaign chairman of the fourth annual Community Chest drive in Spokane.

Lafayette Hanchett, president of the Utah Power & Light Company, and a member of the United States Chamber of Commerce, will represent the Chamber of Commerce of Salt Lake City at the Pan-American commercial conference in Washington, D.C., May 2-5.

Martin M. Johnson, former Denver representative for Hubbard & Company, has resigned to become associated with the Kelvinator Corporation of Detroit, Mich. **Earl Wessel,** district manager, now is handling the territory.

J. A. Cannon, auditor, **A. R. Foster,** superintendent of collection department, **J. M. Bourus,** assistant auditor, and **A. S. Brent,** construction auditor, respectively, San Diego Consolidated Gas & Electric Company, recently attended the annual convention of auditors of H. M. Byllesby & Company, in Pittsburgh.

J. Frank McLaughlin, formerly general superintendent of light and power for the El Paso Electric Company, and subsequently manager of the Baton Rouge Electric Company, has been promoted to ranking vice-president of the Virginia Electric & Power Company, Richmond. He has been vice-president in charge of sales. Mr. McLaughlin succeeds **W. E. Wood,** who was superintendent of railways in El Paso in 1917 and who has been elected president of the Virginia company.

F. D. Brown, general manager, Peoples West Coast Hydro Electric Corporation, Portland, successor to the West Coast Power Company, and now owned by the W. B. Foshay Company, is a comparatively new arrival in the utility field in the Northwest. He went to Portland from the Middle West, where he had been engaged in public utility work for some years, at the time the West Coast properties were acquired by their present owners in the fall of 1926. Mr. Brown is a graduate of Cornell University. He spent a number of years with the Twin City Rapid Transit Company, Minneapolis, leaving that company to enter the light and power field. For eight years he had charge of the Huron Light & Power Company, Huron, S. D., a combined gas and electric property, as secretary and manager. Later he joined the organization of the Wisconsin - Minnesota Light & Power Company, as district manager of its eastern district, Owen, Wis., leaving finally to ally himself

F. D. BROWN

with the W. B. Foshay interests. Before taking his present position he had charge of the northern district of the Minnesota Electric Distributing Company, with headquarters at Crookston, Minn.

J. D. Ross has been reappointed superintendent of lighting for the City of Seattle.

Obituary

Dudley Farrand, vice-president of the Public Service Corporation, Newark, N. J., and a former president of the National Electric Light Association, died in that city March 4.

Edward Carpenter Wood, president, The Mica Insulator Company, Chicago and Schenectady, died in New York Feb. 17. Mr. Wood was a pioneer in the mica insulation industry and had been identified with the Mica Insulator Company since its inception in 1893.

Jack Hampton, since 1923 Northwest manager of the Edison Lamp Works of the General Electric Company, Portland, died in that city Feb. 19, 1927.

Manufacturer & Distributor

Organization of the **Hubble Voltage Control Company** of Bonners Ferry, Idaho, for active manufacturing and sales work has been completed with **Grover Hubble**, president; **W. C. Butler**, vice-president; **Fred Gleed**, treasurer, and **John R. Viley**, secretary. These men with **J. G. Merlin**, Spokane, Wash., and **E. E. Fry** of Bonners Ferry, comprise the directors. The company will manufacture an alternating current electric arc welder which is air-cooled and made in a portable design.

A complete servicing plant for Servel electric refrigerators has been established at 1233 South Hope Street, Los Angeles, according to an announcement made by **A. L. Spring**, manager of the southern California and Arizona agency of the **Servel Company.** While this new plant is intended primarily to handle the wholesale business of southern California and Arizona, some of the metropolitan retail business also will be handled at the new location.

Robert C. Lanphier, for the past ten years vice-president and general manager of the **Sangamo Electric Company**, Springfield, Ill., has been elected president of that company, succeeding the late Jacob Bunn. Mr. Lanphier, who is also president of the Sangamo Electric Company of Canada, Limited, and a director of the British Sangamo Company, Limited, with Mr. Bunn organized the original company in 1899.

H. F. Boardman, Inc., Los Angeles, has announced that **Albert Meinema** has joined its organization as factory promoter on the Central Tube Company's line of conduit and on Paranite wire and cable made by the **Indiana Rubber & Insulated Wire Company**, Jonesboro, Ind. Mr. Meinema formerly was connected with the Electric Appliance Corporation, San Francisco, for sixteen or seventeen years.

The Bull Dog Electric Products Company is the new name of the **Mutual Electric & Machine Company**, Detroit. The change has been made for the purpose of having the company's corporate name correspond with its trade name.

The Century Electric Company, St. Louis, has appointed **F. L. Hall** district sales manager at San Francisco to succeed the late R. J. Davis. Mr. Hall has been connected with the Century company's organization since 1921.

Perkins Electric Equipment Company has announced its removal from 85 Second Street, San Francisco, to 507 Williams Building, 693 Mission Street, in that city.

The Electric Products Corporation of Washington, at Seattle, has been incorporated for $300,000 by a group of Seattle and Los Angeles men, headed by **H. F. Alexander**, president of the Pacific Steamship Company, Seattle. The company plans the establishment of a factory for the manufacture of the Claude-Neon light, a device for outdoor illumination. The concern will be an auxiliary of the Electric Products Corporation of California and of Arizona.

Contracts for Motor Equipment and Locomotives Let.—The General Electric Company through its Seattle office has secured contract for furnishing electrical apparatus, including motors and control equipment, costing $75,000, to the Everett Pulp & Paper Company at Everett, Wash. The equipment will include 12 motors, ranging from 60 hp. down, with push-button, full automatic control; two 175-hp. turbines, and two generators with exciters. The Seattle office also has received contract for six mining locomotives for use in the eight-mile Great Northern tunnel at Scenic, Wash., under construction. Order includes three 20-ton and three 10-ton machines.

The Western Electric Company has announced the organization of the **Electrical Research Products, Inc.**, of Wilmington, Del., a subsidiary corporation formed to take over that portion of Western Electric business which is not related to the manufacture and distribution of telephone apparatus and supplies for the Bell System. All of the new corporation's stock is owned by the Western Electric Company.

The Bowie Switch Company now is occupying its new factory at 19th and Tennessee Streets, San Francisco.

Headquarters of the Universal Cooler Company at 925 Mission Street, San Francisco. V. Howard Wattles is manager of this store.

The Standard Underground Cable Company, Pittsburgh, has been awarded a gold medal by the International Jury of Awards of the Sesquicentennial Exposition, in connection with the exhibit of its products, including bare and insulated electric wires and cables, cable terminals, junction boxes and accessories, a gold medal being the highest award in this class of exhibits. The company's exhibit as a whole was planned to show the general scope of its manufactured products at the present time and also the progress and improvement made since the early days of the industry.

Expansion of territory and products has been announced by the **Brown-Johnston Electric Company**, Spokane, which now is opening up sales work in California. **D. D. Flenner**, former manager of the Idaho Electric Supply Company office at Boise, has been made a vice-president and placed in charge of sales in Utah, Montana and Coast states. At a recent election **E. A. Johnston** was named president and **I. B. Johnston**, secretary-treasurer.

Electro-Kold Corporation, Spokane, has announced that Electro-Kold sales in King County, Wash., will be in charge of the **Electro-Kold Sales Corporation** with offices in the Lloyd Building. **Harry F. Jahn** is manager of the new company. In San Francisco **E. A. Cornely Company**, 1452 Bush Street, will handle the Electro-Kold product. By leasing a 3-story building adjoining the Spokane factory the Electro-Kold Corporation has trebled its floor space and is planning to double its manufacturing staff in preparation for the 1927 output.

Philadelphia Grease Manufacturing Company, Philadelphia, has placed the Western management of its business in the hands of **M. B. Urquhart**, for the past twenty years Northwestern manager for the Keystone Lubricating Company. Offices and warehouses are maintained in the Ideal Building, Denver, and at 144 South Fifth West Street, Salt Lake City.

Eicher & Bratt, sales engineers representing the **Pittsburgh Transformer Company, Electric Power Equipment Company**, and **Kelman Electric & Manufacturing Company** in the Pacific Northwest, announce that **O. A. Demuth**, formerly connected with the Seattle office of Stone & Webster, Inc., now is associated with them.

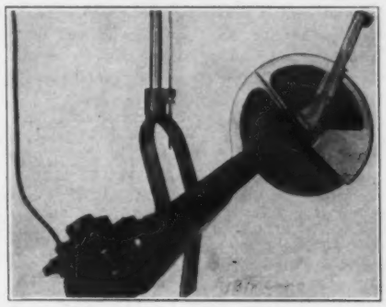
The Albert S. Knight Company, 2203 First Avenue South, Seattle, has been appointed representative of the Trico Fuse Manufacturing Company, Milwaukee, Wis., and carries a complete stock of that company's products. **The Coast Electric Company**, 222 South San Pedro Street, Los Angeles, is the company's California representative.

New Equipment

Butchers' Electric Hand Saw

An electrically driven circular saw for the use of butchers in cutting bone has been placed on the market by the **Monarch Electric Saw Company,** 519 California Street, San Francisco.

In the words of the manufacturer, the saw is suspended above the butcher block or table by ball-bearing rollers



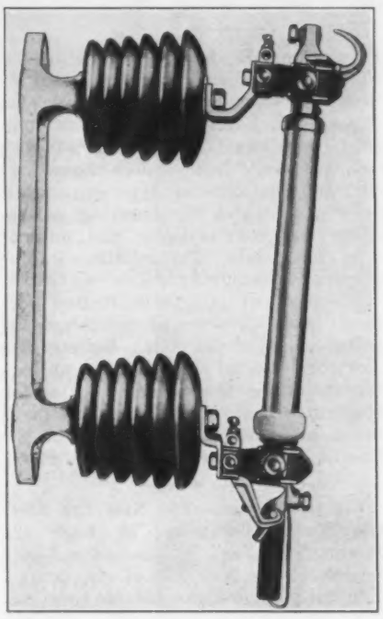
which travel on a shaft which is hung from the ceiling or wall or upon uprights from the floor. By varying the length of the shaft the Monarch saw can be used on any number of tables or blocks desired. The electric motor which runs the saw blade counterbalances the weight of blade and guard, so that when not in use the saw automatically swings upward and out of the way. An ingenious automatic contact switch turns on the power as the saw is pulled down, so that a single motion of the operator's hand starts the saw and puts it into position for cutting. After the cut is made and the handle released, the saw swings upward and the contact is automatically broken so that the power is on only when the saw is in use. An extremely important feature is the gravity guard, which is raised as the operator grips the handle and released as he lets go, thus insuring him positive protection from the blade. The saw, which is for cutting bone only, can be used for every operation from cutting chops to breaking beef. It is ideal for cutting frozen meat and its use eliminates cleaver work, thus doing away with slivered bone.

A new bench-type wire stripper has been placed on the market by the **C. H. Carlson Manufacturing Company,** 13 Main Street N. E., Minneapolis, Minn. It is claimed that this device insures fast, uniform stripping of wire ends on all sizes up to No. 6 solid or stranded and cut wire of all sizes up to No. 10 solid or stranded, quickly removes the insulation on cotton, rubber or asbestos covered wire without injury to the wire and is especially efficient in stripping stranded wire. This device has very few moving parts and should last even in continuous service for a great many years, according to the manufacturer.

Fuse Switch

An outdoor, expulsion-type fuse switch for 7.5 kv. and 15 kv. with 13-kv., 20-kv. and 25-kv. insulators has been placed on the market, together with a complete line of disconnecting switches, choke coils, and combinations, by the **James R. Kearney Corporation,** manufacturer of overhead and underground utility equipment, 4224 Clayton Avenue, St. Louis.

This fuse switch has been perfected by Kearney engineers for the lowest amperages; for loads up to 100 amp.; for the highest altitudes; for dust, fog, and acid fume conditions; for clearing the severest shorts; and for preventing leakage over the dead cartridge, according to the company's announcement. Distinctive features incorporated in this Kearney outdoor-type fuse switch include: self-aligning, full-floating contacts, combination clamp and screw-type lugs, flat surface base for crossarm

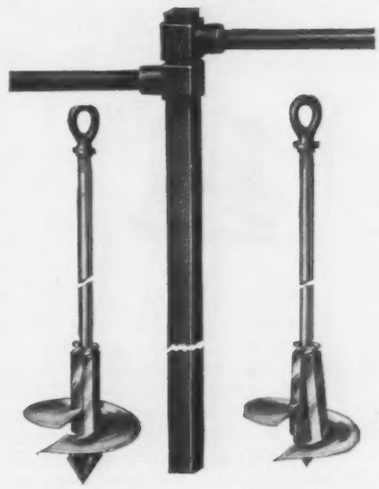


U-strap mounting, removable cartridge interchangeable with a disconnect blade, positive lock, blade stop, cartridge refusable in the field, insulator inserts alike, and convertibilty for mounting in any position.

The **Wilwear electric range** which does not require special wiring but uses the same wall or floor outlet as other appliances is being offered by the **Novelty Manufacturing Company** Division, the Risdon Manufacturing Company, Waterbury, Conn. The range comes in three sections, stove, oven and base, which come apart without changing connection or removing screws. Both oven and stove may be used separately and will not heat any surface on which they are placed, according to the company. The range is claimed to be ideal for cottage, apartment or camp and its moderate price, $49.50 complete, is an added attraction.

Improved Expand Screw Anchor

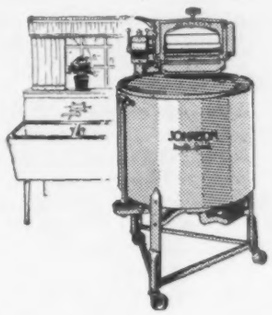
The **Improved Expand Screw Anchor,** manufactured by the **Everstick Anchor Company,** St. Louis, will provide 50 per cent more holding power than any other screw type anchor of like size, according to the guarantee of the company. Made in one size, 6½ in. in diameter when closed, it automatically expands to 7¼ in. when strain is applied. When two persons are handling the wrench the Expand Screw Anchor can be made to enter the earth at the rate of one foot per minute, the company states.



The expand screw is made of malleable iron and will not break either in transit or when being installed.

Multi-Speed Washer

The Johnson Washer Company, Oakland, Calif., has placed on the market a new model known as the **Multi-Speed Washer** which it claims will wash a tubful of clothes in from three to eight minutes, depending on the clothes. This new model has two speeds, a fast washing speed for washing ordinary heavy clothes and a slower gentler speed that is safe for dainty things. Other features claimed for the new washer, which is of the agitator type with a bottom drive running entirely in grease, are one lever control, small floor space, large castors, adjustable

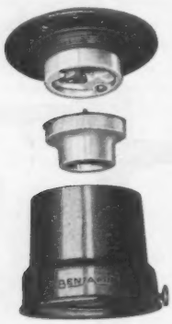


legs, direct drive, self-lubrication. The machine carries a 20-year guarantee against defects.

Heavy Duty Two-Piece Hoods

Wiring the socket has been made easier in Benjamin Type RR heavy-duty lighting equipment, manufactured by **Benjamin Electric Manufacturing Company,** Chicago, by the development of a separable feature in the cast-iron hoods of that line.

The company announces that the "easy-to-wire" feature is accomplished



with two-piece hoods in place of the former one-piece type, the body of the hood being attached to the cap by means of a fine screw thread. Removal of the body exposes the terminal base and gives easy access to the wiring terminals, in contrast to the terminals heretofore having been recessed by the body of the hood. The new hoods are made in both pendent and outlet box types. They have the Type RR screw thread for attaching reflectors, the same as the former one-piece hoods, and are adaptable to the same socket equipment.

A new **Raco duplex laundry box** designed for use in apartment building basements where the light in the laundry is carried on tenants' meters instead of building meters has been put on the market by **Roach Appleton Manufacturing Company,** 3440 N. Kimball Avenue, Chicago. This box will take care of plug contact from the light as well as plug contact from the washing machine at the same time, according to the manufacturer's announcement, both receptacles meeting the latest requirements as to polarity. The announcement also states that the plate carrying the receptacle is removed easily for wiring by taking out one screw, and the box is provided with a cover and hasp to be locked with padlocks provided by the tenants.

W. S. Rockwell Company, 50 Church Street, New York, recently has added to its line of **electric furnaces** a revolving retort type which it claims is well adapted for the heat-treatment of a great variety of small ferrous and non-ferrous metal parts. In the words of the announcement, the advantages of electric heat and continuous movement of the stock in a thin stream through the revolving retort make it an efficient production unit under conditions that justify electricity as a source of heat.

Recent Publications

"The Triangle."—This is the name of the publication recently inaugurated by the **Triangle Conduit Company, Inc.,** Brooklyn, N. Y. In its foreward it hopes that it may be "the means of passing along a profitable idea, an encouraging thought, or an occasional grin to other members of the huge electrical family of America."

Fans.—For the 1927 season **The Robbins & Myers Company,** Springfield, Ohio, has issued the following publications: Advance Bulletin No. 1318 covering the new fans added to its line; a dealer sales manual entitled "Sales-Points and Appeals of Robbins & Myers Fans," form No. 1306; and a miniature catalog, form 1302, giving complete description and illustrations of the company's line of fans.

Switching Equipment.—Bulletin 312, 12 pages, published by the **James R. Kearney Corporation,** 4224 Clayton Avenue, St. Louis, describes that company's new expulsion type outdoor fuse switches and fuse switch-choke coil combinations, outdoor type disconnecting switches and disconnecting switch-choke coil combinations, and outdoor type choke coils. The bulletin contains prices and discounts for Kearney switching equipment and is illustrated profusely with all types of mountings for switches and choke coils. Bulletin 316 describes special porcelain mountings for mounting the Kearney expulsion plug cutout onto a crossarm, and gives prices and discounts. The use of the Kearney fuse puller also is illustrated.

Electric Range.—The New Era Electric Range Company, 50 East 42d Street, New York, has issued a folder describing the New Era electric range. Unusually rugged and durable construction, compactness, portability, elimination of special wiring requirements, ample capacity, low operating cost and efficiency in operation are some of the advantages claimed for this range.

New Price Sheets.—W. N. Matthews Corporation, St. Louis, has issued new and complete price sheets on its fuse and disconnecting switches, adjustable reels, Scrulix anchors and Holdfast lamp guards.

"HB" Equipment.—Pamphlets describing its portable trouble shooter, test bench, compressor and battery charger recently have been issued by **Hobart Brothers Company,** Troy, Ohio.

Conveyor Toaster.—Edison Electric Appliance Company, Inc., Chicago, has prepared for its jobber-distributors material for its conveyor toaster drive to introduce its new electric continuous-service toaster designed to meet the requirements of restaurants, hotels, cafeterias, lunch rooms, sandwich shops, hospitals, etc. The company also has prepared for central-station commercial managers a broadside showing the Hotpoint plan and the Hotpoint co-operation for the concurrent advertising campaigns sponsored by the National Electric Light Association, and also has issued for its dealers a 1927 catalog supplement showing twenty-four new Hotpoint appliances recently added to its line.

"Diskelectro" Oil Filter.—A pamphlet announcing and describing the "Diskelectro" oil filter has been published by **S. F. Bowser & Company, Inc.,** Fort Wayne, Ind. The company is represented in San Francisco by **Theo F. Dredge,** 819 Monadnock Building.

Annunciators, Bells, Buzzers and Signal Equipment.—This is the title of Bulletin No. 60-29-A published by **Chas. Cory & Son, Inc.,** 183-7 Varick Street, New York City. It contains 60 pages of description, 117 illustrations, and alphabetical, numerical and thumb indexes. Copies may be obtained upon request.

Conveying, Elevating, Screening and Transmission Machinery.—General Catalog No. 30 descriptive of its line of material-handling labor-saving machinery has been compiled by the **Stephens-Adamson Manufacturing Company,** Aurora, Ill. Copies may be obtained upon request to the catalog department.

The Advantages of Ball Bearings in Electric Motors.—Issued by the Engineering Service Department of the **New Departure Manufacturing Company,** Bristol, Conn. This booklet sets forth the advantages of the use of ball bearings in electric motors. It is illustrated with numerous photographs showing ball bearing motor installations and cross-sections showing various types of mounting ball bearings in motors.

Meter Element, Movable Scale and Quick Trip Graphic Instrument.—Bulletin 1126 issued by **The Esterline-Angus Company,** Indianapolis, manufacturers of graphic instruments, describes a new direct current meter element, an improvement in its scale plate and an addition to its Quick Trip line.

Kitchenette and Light Housekeeping Cooking Devices.—This is the title of a pamphlet recently issued by the **Standard Electric Stove Company,** Toledo, Ohio, describing its model 4012 developed for kitchenette use.

Wiring Devices.—Under this title the 1927 catalog published by the **Bryant Electric Company,** Bridgeport, Conn., illustrates and describes 4,000 wiring devices manufactured by that company.